



# International Abstract of Surgery

*Supplementary to*

Surgery, Gynecology and Obstetrics

Volume 64

JANUARY TO JUNE, 1937

PUBLISHED BY

THE SURGICAL PUBLISHING COMPANY OF CHICAGO

54 EAST ERIE STREET, CHICAGO

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# INTERNATIONAL ABSTRACT OF SURGERY

JANUARY, 1937

## COLLECTIVE REVIEW

### REVIEW OF THE LITERATURE ON PETROSITIS<sup>1</sup>

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ALTHOUGH involvement of the petrous portion of the temporal bone had been recognized since the time of Brouardel (1866) and von Troeltsch (1869), no attempt at organizing either the symptoms or the pathologic changes was made until Gradenigo called attention to the association of a trigeminal type of pain associated with paralysis of the abducens. Gradenigo had no clear understanding of the underlying pathologic changes however, and there is some debate whether the term "Gradenigo's syndrome" is one that conveys a definite meaning to modern otologists. The discussions in regard to the underlying changes present in Gradenigo's syndrome gave rise to much clinical and anatomic investigation, and in 1904, at the International Congress of Otology at Bordeaux, Mouret and Lafitte Dupont presented reports on the anatomic relationships between the middle ear and the petrous apex and demonstrated 6 lines of cells around the labyrinthine capsule extending toward the apex. These cell tracts had been described in detail by Bezold in 1882, but as Bezold did not have the specific problem of petrositis in mind, more effort is required by the reviewer to secure information of surgical value from his description.

Streit, in 1902, described a technic for approaching the petrous apex after an operation he had seen performed by Goris. In this technic the tegmen of the tympanum, tritum, and mastoid was removed following radical mastoidectomy, and a sufficient amount of the lateral wall of the temporal fossa was removed to allow elevation of the temporal lobe. The apex was then approached by elevating the dura over the superior surface of the petrous pyramid.

The remarkable thesis of Baldenweck was published in 1908. This was the first successful attempt to integrate anatomic, clinical, and pathologic observations in relation to disease in the petrous portion of the temporal bone. Baldenweck defined the petrous apex as the portion of the temporal bone medial to the labyrinthine capsule and described its anatomy in detail. He recognized 3 types of development of the bone, (1) spongy or areolar, (2) compact, and (3) cellular with varying mixtures of the 3, and pointed out that the pneumatization of the petrous apex is in relation to the pneumatization of the walls of the cavities of the middle ear. He mentioned the peritubal group of cells first described by Urbantschitsch, the tubal and pericarotid cells which were emphasized by Mouret and by Lafitte-Dupont, and the retropetrous cells which turn around the facial canal and the external and superior semicircular canals, but he insisted particularly on the importance of the sublabrynthine tracts which he had seen produce a fatal meningeal suppuration.

In a detailed discussion of the etiology and pathologic anatomy of osteitis of the apex of the petrous pyramid, he stressed particularly the part played by the preformed cell tracts in favoring advance of disease beyond the labyrinthine capsule. He believed that the diagnosis of petrositis depends particularly on deep seated, continuous pain with characteristic exacerbations in the distribution of the fifth nerve. He stated "The pains are most often sub- and supra-orbital with retention in the depth of the orbit." He also mentioned the diagnostic importance of a nasopharyngeal or peripharyngeal abscess.

Concerning operative indications Baldenweck said "In my opinion, if one is correct in suspecting an osteitis of the tip of the pyramid, while it

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may be possible or probable, certitude can never be actually acquired. It is possible when one of the following symptoms appear: paralysis of the third and more particularly of the sixth, and signs of marked irritation of the trigeminal. We might consider an eventual intervention in this case. It is probable if these signs are associated with one another or to a peripharyngeal collection, to deep pains or to signs of retention of pus. The appearance of a thrombosis of the cavernous sinus may lead to confusion by the paralysis which it is able to produce although this itself may originate from an osteitis of the petrous apex. How and when to intervene? The wisest conduct appears to us not to immediately expose the petrous apex, but to operate in two stages. At the first step a very large radical type of operation should be done and diseased cell tracts if present should be followed as far as possible. One should uncover systematically and to a sufficient extent the wall of the lateral sinus and the dura mater in the region of the tegmen. If unmistakable lesions lead up to the apex, they should be followed there while being careful to avoid the carotid, the sixth, and the cavernous sinus. One should try to avoid opening the dura, which is difficult because it is adherent and often softened by disease. If the radical and the different explorations mentioned are without a favorable result if free drainage has not been assured, if symptoms persist, one should be authorized before the explosion of a meningeal or cerebral complication to uncover the petrous apex at a second operation. "For this Baldenweck recommended either the procedure of Goss and Streitt or that of Voss (83). In the former, a large radical opening is made with extensive removal of bone of the floor of the temporal fossa both anteriorly and posteriorly and the temporal lobe is elevated by a special spatula. In the latter, a bone flap is formed in the temporal fossa; the jaw bone is temporarily cut through, the bone of the greater wing of the sphenoid is removed until the foramen ovale and the foramen rotundum are reached, and, after elevation of the brain which has been rendered less tense by a lumbar puncture, the second and third divisions of the fifth nerve are followed to the gasserian ganglion. The first method of approach has the disadvantage, according to Baldenweck, of endangering the cavernous sinus for which reason he prefers the second method which has the additional advantage of allowing dependent drainage.

This monograph of Baldenweck's covers the subject in such detail gives such a true clinical picture, and suggests such a common sense surgical procedure for the relief of the lesions that the

remainder of the literature on petrositis is in the nature of addenda to, and comments upon, it. It formed the basis for the discussion of Perkins (58, 59) and of Wheeler, but was later forgotten. It might be said that in no subsequent publication have the symptoms been described much more accurately or have the suggestions for surgical treatment been much improved on, and that, in general, Baldenweck's monograph is far superior to most of the articles on the subject appearing in the current literature. It has a curiously modern sound, being more in accord with the discussions of 1935 and 1936 than with those of the period from 1931 to 1934. Between the publication of this monograph and that of the epoch making articles of Profant (60), Friesner and Druss, Eagleton (15), and Kopetzky and Almour (41) the subject was considered generally in the same haphazard way as before, without sufficient understanding of the pathologic conditions or a clear appreciation of the symptoms suggesting their presence. Therefore it may be said that the present day competent banding and understanding of the lesion are due almost entirely to American otologists.

Perkins, in 1910 reported the conclusions he had drawn from 6 cases of paralysis of the abducens nerve in purulent otitis media which he had observed personally, together with a review of 95 cases recorded in the literature. In 13 of the 33 cases in which the cause of paralysis of the abducens nerve could be ascertained, it was found to be disease of the petrous tip. Perkins appreciated the part played by the circumlabrynthine cell tracts in propagating disease toward the apex, but had a rather loose grasp of the symptoms produced by the lesion. He believed the subdural exploration of Streitt to be the method of choice in approaching the apex. An extremely complete bibliography accompanies the article.

Wilkinson, in 1914, reported a case of paralysis of the external rectus muscle due to an abscess in the apex of the petrous pyramid. The organism responsible was the diplococcus pneumoniae Type III. At necropsy it was found that the disease had advanced along the cell tracts extending from the anterior part of the tympanic cavity above and below the eustachian tube to the carotid canal and thence to the area of spongy or cellular bone lying at the apex of the pyramid behind the carotid canal and internal to the internal auditory meatus. The carotid artery was exposed to an extent of  $\frac{3}{8}$  inch (1.27 centimeters) in the anterior wall of the abscess cavity.

In the same year, Westmacott in discussing oculomotor paralysis of otitic origin, expressed the

opinion that, in disease of the petrous apex, isolated paralysis of the oculomotor nerve must be due to involvement of the nerve just after it pierces the dura mater beside the posterior clinoid process in the small triangular space between the free and attached borders of the tentorium cerebelli just before it enters the cavernous sinus. This is an excellent discussion of ocular paralysis in relation to otitic disease.

Jouty, in 1917, reported a case of osteitis of the apex of the petrous pyramid in which recovery followed an operation performed by the subdural route after the manner of Streit. Except for this case report his article is an epitome of Baldenweck's monograph.

Wheeler, in 1918, considered paralysis of the sixth cranial nerve associated with otitis media, and emphasized the possible rôle played by suppuration in the petrous apex in that condition. Of particular interest is his report of an operation by Kernson, who searched for perilyabyrinthine cell tracts, which was followed by recovery. There are excellent illustrations showing the relations of the petrous apex to the sixth nerve.

Girard, in 1914, published his "Atlas" of the surgical anatomy of the labyrinth, in which he clearly illustrated the perilyabyrinthine cell tracts.

Perkins, in 1920, published a second paper on involvement of the sixth nerve in purulent otitis media. He reported a case in which he interpreted an intermittent free discharge of pus from the mastoid wound as indicating involvement of the petrous portion of the temporal bone, and a case in which a discharge from the mastoid wound persisted until a retropharyngeal abscess, in which a curved applicator could be directed upward to the base of the skull, was opened.

Uffenorde, in 1920, reviewed the German literature on the subject of otitis media with extension to the perilyabyrinthine region. He mentioned especially the peritubal cells and the cells along the posterior wall of the pyramid, and noted that the disease is able to break through the wall of the pyramid anywhere along these cell tracts and also to produce acute labyrinthitis by eroding the labyrinthine capsule. The symptom he cited as the most prominent was neuralgia along the fifth nerve, but he mentioned also the presence of retro-orbital pain. He advised searching for infected cell tracts around the periphery of the labyrinthine capsule, but for cases in which the labyrinth is involved or previous exploration has failed to relieve the symptoms, he recommended a trans-labyrinthine approach to the apex of the pyramid.

Holmgren, in 1922, published a report of what seems to have been the first successful attempt to

drain the petrous apex through the labyrinth. After the performance of a radical operation the semicircular canal system was completely chiseled away and a small purulent tract along the inferior margin of the petrous pyramid was followed. The tract led to a cavity, the size of a bean (about 2 by 1 centimeters) which was filled with creamy pulsating pus. The bottom of the cavity was 5 centimeters medial and anterior to the posterior semicircular canal, and the pulsations of the carotid could be felt with the probe.

Chamberlin, in 1924, published an article on the Gradenigo syndrome, which is valuable chiefly because of the extensive bibliography and the interesting discussions of Coates and of Hunter. Coates believed that the appearance of palsy of the abducens nerve in the course of suppurative otitis media calls for surgical intervention. He mentioned favorably the approaches used by Streit and by Holmgren.

In discussing 2 cases of Gradenigo's syndrome, Maybaum described 4 perilyabyrinthine cell tracts by which disease of the tympanum may reach the petrous apex. In a discussion of Maybaum's paper Braun described a case in which the initial sign was an abscess in the sphenomaxillary fossa. After drainage of the abscess the ear began to discharge and palsy of the external rectus muscle, with pain in the distribution of the fifth nerve on the same side, developed. Subdural exploration of the petrous apex was done, but as the apex appeared normal, it was not opened. At necropsy, the entire petrous pyramid was found broken down and filled with pus.

In an article published in 1927, Richards described his technic for removal of the petrous pyramid and reported his results in 8 of his own cases. This article is invaluable if it is planned to approach the pyramid by any of the subdural methods as it considers the surgical anatomy of the region in detail and is full of technical suggestions that can be gained only through experience. Of particular interest are Richards' observations that the exposed carotid artery showed no visible pulsations that when it was injured the bleeding was essentially venous in character, and that there was no pulsation to the stream, no spurting of blood to indicate that the current was under any considerable degree of variable pressure.

Bowers, in 1928, reported 2 cases of suppuration in the petrous pyramid in which recovery resulted after enlargement of the suppurating cell tract. In one case the tract was above and anterior to the superior semicircular canal, and in the other below the inferior semicircular canal. Bow-

ers believed that involvement of the anterior cell tract tends to produce pain in the region of the temple or in the eye, whereas involvement of the inferior cell tract is more apt to produce labyrinthine symptoms. The successful outcome of exploration of the petrous pyramid along preformed cell tracts in the cases he reported apparently made little impression on the auditors of his paper (37) as they were unwilling to grant that a logical method of attack on the lesion had been suggested. They thought also that pain in the fifth nerve and irritation in the labyrinth are insufficient to indicate its presence. Bowers' paper is an epitome of many later papers. In the period from 1929 to 1931 the increase in knowledge regarding disease of the petrous apex resulted in papers by Eagleton (15), Friesner and Druss (23), Profant (60), and Kopetzky and Almour (41).

Eagleton's paper on the symptoms of involvement of the petrous pyramid published in 1930, is undoubtedly one of the most carefully considered and clinically valuable contributions on the subject made to date. Eagleton believes that facial pain is diagnostic of involvement of the middle fossa and that facial pain referred along the first division of the fifth nerve deep behind the eye can be explained only by inflammation in the petrous apex which produces tugging and pulling on the first division. He does not believe that facial pain is likely to be produced by direct involvement of the gasserian ganglion in a suppurative process. In discussing the mechanism of production of referred facial pain through the greater superficial petrosal nerve, he expressed the opinion that involvement of the nerve is more likely to produce pain in the distribution of the second division. He concluded "From an operative standpoint a temporo-facial pain, or a neuralgic pain in the supra orbital region around the eye or in the face or teeth associated with or following an otitis, if unaccompanied by sign of sepsis, cerebral irritation or labyrinthitis, simply calls for the complete extirpation of the mastoid cells with as much of their perilabyrinthine cellular elements as have direct communications which can be demonstrated macroscopically. This having been done the continuation of the facial pain only becomes of serious moment if the sepsis continues. Pain in the first branch limited to the region behind the eye is significant of irritation of the dura over the petrous apex and, in the presence of continued sepsis, signifies caries of the petrous apex." He reviewed in detail the factors that may produce both homolateral and contralateral paralysis of the abducens nerve and considered the diagnostic significance of this paralysis in suppuration of the

petrous pyramid, thrombophlebitis of the petrocarotid venous plexus and the cavernous sinus, and other lesions that may tend to produce pressure on the nerve. He referred also to involvement of the bulbar cisterna, and pointed out the early tendency toward localization of meningitis and the possibility of successful surgical intervention. As pathognomonic of bulbar cisterna meningitis he cited (a) semicoma from which the patient can easily be aroused (b) supine position of the patient (on back) with the eyes closed, and (c) in intermittent recurrences of vertical nystagmus."

This paper should not be read without reading also its sequel, an article entitled "Unlocking of the petrous pyramid for localized bulbar (pontile) meningitis secondary to suppuration of the petrous apex," which was published in 1931 (16). In the latter the embryologic and pathologic bases of suppuration in the petrous apex are considered as well as the bacteriology and histology of the lesions. The lesion in the mastoid process is considered by Eagleton to be of 2 types, one a coalescing mastoiditis produced by a non hemolytic organism, in which the pathologic sequence is swelling and round cell infiltration of the epithelial lining of the pneumatic cells followed first by caries with pus and granulation formation and later by involvement of the sinus or leptomeninges from pressure necrosis, and the other a mastoiditis caused by a hemolytic organism, in which the infection may attack simultaneously the small blood vessels and the venous plexuses of the sinus or the leptomeninges. Eagleton further stated "In hemorrhagic mastoid the suppuration extends by a retrograde thrombophlebitis or perivascularitis and early intracranial complications are frequent." Because of the unique character of the bone of the apex of the pyramid, which resembles the metaphysis of a long bone in structure and function, its cellular spaces being filled with medullary substance, infection of the apex of the pyramid is a true osteomyelitis and therefore differs from the previously considered process in the mastoid. If, in exceptional cases, the apex contains pneumatic cells, it is the only region of the body in which pneumatized cells containing non ciliated epithelium may be brought into contact with the medullary substance of a blood producing bone without a layer of bone and a mucus producing protective mechanism intervening.

With regard to suppuration involving the petrous, Eagleton stated "The three anatomico-physiologic peculiarities (a) periosteal blood supply, (b) growing bone and (c) exposure of marrow-containing bone substance to direct infection, not only influence the cause and character of any sup

purative lesion that may attack the apex, but also, I believe, render the apex especially liable to infection reactions in mastoiditis as well as providing it with unusual facilities for its control." Eagleton noted the production in the petrous apex of acute hematogenous osteomyelitis that is encountered only in the long bones in childhood up to the age of about 10 years and is caused by the continuing growth of the petrous apex. It is an arteriothrombo-embolic phenomenon which rapidly results in sequestration, especially of the bony labyrinth, and has a very high mortality. When, after about the age of 10 years, the pneumatic cells extend into the petrous apex, there results what Eagleton termed "chronic osteomyelitis suppurative and reparative of the petrous apex." In his discussion of this condition he said "This type of osteomyelitis is due to the direct extension of an infection to (1) the periosteum of the petrous pyramid, or (2) into the medullary substance. The infection reaches the apex by way of (a) a retrograde thrombophlebitis of the perilymphathic veins, (b) through the labyrinth or (c) by way of the pneumatic cells which surround the labyrinth. Clinically and pathologically the disease may be chiefly limited to a periosteitis of the apex or may be a medullary infection of the apex. If the infection involves only the periosteum, as occurs in many of the petrous cases, there will result a superficial erosion of the superior surface of the petrous or the floor of the middle fossa. When the medullary cells are attacked by the infection (a) a congestion results, following which the extent of the normal reactive processes of the bone and the virulence of the micro-organisms will dictate whether the inflammation causes macroscopic or microscopic (b) carries, or (c) abscess. The destructive lesions are modified by the reparative process of the actively growing bone."

Eagleton described also 3 clinical types of osteomyelitis of the apex. The first 2 types occur when marrow is present in the apex before there is pneumatization of the mastoid itself. In the first type, which occurs in infants, a retropharyngeal abscess of petrous origin is formed. In the second type, which occurs after infancy, there are abscesses of the upper lateral pharyngeal wall, the situation of which is determined by the attachment of the levator veli palatini muscle to the anterior part of the base of the petrous apex. The third type is described as chronic suppurative and reparative osteomyelitis of the petrous apex.

From pathologic studies of the lesion, Eagleton concluded that the surgical indication in osteomyelitis of the petrous apex is simply to enter the medulla of the bone by a sufficiently large opening

in the bony cortex. Even when pus is present it is not necessary to eradicate the whole infected area, as in disease of the pneumatic bone, because the marrow itself has great reparative properties. In the cases cited the suppuration in the petrous apex was manifested first by a pain deep behind the eye with paralysis of the sixth nerve. After a complete mastoidectomy, this did not clear up but continued with the presence of sepsis of a low grade, and during that stage both the petrous apex and the bulbar and angle cisterns were invaded. The meningitis, however, remained localized for a considerable period.

According to Eagleton, the surgical objectives in an operation for suppuration in the petrous apex, are (1) exposure of the external wall of the labyrinth and region of the eustachian tube to allow unobstructed inspection, (2) elevation of the dura over the surface of the pyramid to permit opening from above when the labyrinth is not involved, (3) exposure of the anterior surface of the posterior fossa (or posterior surface of the pyramid), and (4) exposure of the areas containing the perilymphathic cell tracts. To attain these objectives when complete mastoidectomy and a search for perilymphathic cell tracts failed to relieve the symptoms, Eagleton performed a radical mastoidectomy and then extended the cutaneous incision from the attachment of the tragus 2 inches (5 centimeters) directly upward and also down in front of the ear to the zygoma. In this incision care was taken to avoid injuring the fascia over the temporal muscle. The attachment of this muscle was cut along the linea temporalis and the muscle reflected forward. Another incision was then made down to the bone and extended directly backward from the tip of the mastoid. When this had been done, the zygomatic root was removed, together with a triangular segment from the posterosuperior part of the glenoid fossa. The dura over the temporal fossa was exposed by removing the bone of the tegmen of the attic antrum and mastoid, and sufficient bone over the lateral surface of the temporal lobe was removed to allow easy elevation of that lobe. The bone over the sigmoid sinus and Trautman's triangle was removed, care being taken to start the removal back of the upper knee of the sinus. Next, the angle of bone between these 2 regions along which the superior petrosal sinus runs was removed, the removal of bone was carried down to the capsule of the labyrinth, and the cancellous bone in the solid angle was removed. A search was then made for tracts in the region of the eustachian orifice, above and through the arch of the superior semicircular canal in the superior and inferior postabyrinthine

regions and the sublabrynthine region. The dura over the posterior surface of the petrous apex was freed with care, and the sigmoid sinus and cerebellar lobe were retracted posteriorly to allow inspection of the posterior surface of the pyramid to the internal auditory meatus. If the apex had not been entered by any of these procedures and the labyrinth was not involved the apex was entered through the bone of the superior surface of the apex of the pyramid. If the labyrinth was involved, the usual labyrinthectomy was performed and the apex was entered below the facial canal. As Egleton was operating for bulbar and angle meningitis, he ligated the common carotid artery and opened the dura near the internal auditory meatus.

While these 2 papers by Egleton are exceedingly valuable contributions on the symptoms, pathology and surgery of disease of the apex of the petrous pyramid they suffer from including some debatable material on the treatment of meningitis and from too much insistence on the venous channel of infection and retro-orbital pain in diagnosis although the latter was mentioned in connection with suppuration in the apex alone rather than in the pyramid as a whole. The operation of 'unlocking the petrous pyramid,' although tedious does not require extraordinary skill. The tracts over the superior canal in the superior and inferior postlabrynthine regions and in the sublabrynthine region can be reached by merely extending the complete mastoidectomy slightly, and as a rule the apex may be drained by enlarging these tracts appropriately. If desired, the peritubal cells and the infracochlear cells may be exposed by a radical mastoidectomy. Nevertheless, Egleton's operation is a technique by which all these explorations may be accomplished, and in a certain residuum of cases is the only method that will promise success.

Profant, in 1931, reported the findings of dissection of 50 temporal bones, which included those of adults, those of fetuses of 5, 6 and 7 months and those of 2 infants born at full term. He was able to show that all the perilabyrinthine cell tracts develop either from the epitympanum or the hypotympanum. The eustachian tube forms a sort of dividing point the cells above it developing from the epitympanum and those below it from the hypotympanum. The line of the aqueductus cochleae to the saccus coccolymphaticus forms a posterior division. Profant stressed the importance of this origin when explaining the appearance of petrositis as a complication of otitis media without the development of mastoiditis. He was the first to suggest the term

"petrositis" for inflammation involving the petrous pyramid. His paper is of considerable clinical importance, but of less surgical importance than that of Mouret although his measurements of distances in the petrous pyramid are of great value. It maintains the balance which too much emphasis on the venous route of advance might have disturbed. Profant also suggested the desirability of exploration along the known cellular tracts.

Friesner and Druss, in 1930, reported a detailed pathologic study of the petrous pyramids in 3 cases of "osteitis of the petrous pyramid." They pointed out and were the first to emphasize the important fact that infection in the petrous pyramid does not always involve the apex. They said "All infections in the petrous pyramid do not necessarily extend to the apex. Moreover, an infection in the pyramid may perforate the bony cortex before it reaches the apex. At the site of such a perforation there may be an extradural infection which may either remain localized or extend mesially along the dura and involve the fifth and sixth nerves separately or together." The importance of this statement in relation to symptomatology and surgical procedures cannot be overemphasized, for it implies that typical symptoms of "apicitis" may be produced by perilabyrinthine disease, and an attempt to diagnose the site of the involvement from the symptoms is of academic interest only. It therefore removes the apex of the petrous pyramid from the center of the stage and puts it in its proper place as merely one part of the petrous pyramid involvement of any part of which is as important as involvement of any other part. It also furnishes a much more logical viewpoint from which to consider surgical attack. Although Friesner and Druss reported the condition as "osteitis," study of the sections they made supports the contention of Egleton that there is abundant marrow tissue in the petrous apex. They also insisted on the importance of the perilabyrinthine cell tracts in the evolution of the lesions.

Kopetzky and Almour, in 1930, published a detailed paper on suppuration of the petrous apex. They devoted the introduction to a discussion of Gradenigo's syndrome and quoted with approval Vogel's statement "Otogenic paralysis of the abducens is not diagnostic of affections of the pyramidal tip." They stated also "Suppurations of the petrosal pyramid are of two varieties (a) frank suppurations of the pyramid, more particularly its tip, and (b) osteomyelitis of the petrosal pyramid ultimately leads to the endocranial structures, its route of advance is not as specific, it does not

form as marked a clinical entity in its development, and the same surgical technic is not applicable to it." However, this generalization is not supported by evidence drawn from their own work or from that of others. It is difficult to understand how suppuration could occur in the pyramid without involving the adjacent marrow, and it would seem that Eagleton's contention that the lesion in the tip is osteitis of the pneumatic cells added to myelitis of the marrow cells, the one modified by the other, is more in accord with the evidence. Kopetzky and Almour reviewed some of the literature on the cellular structure of the labyrinth, but unfortunately overlooked the more complete studies of the French investigators. They considered the membranous labyrinth, the fifth, sixth, seventh, eighth, ninth, tenth, and eleventh nerves, the carotid artery, the eustachian tube, and the petrosal nerves "as anatomical factors of importance in the comprehension of the lesion." The importance of the perilymphatic cells in the causation of the lesion was stressed. From the evidence it seems that these cells are the usual route of advance of infection, and that the thrombophlebitic process appears only occasionally.

In discussing the symptoms, Kopetzky and Almour (41) insisted that pain deep in and about the orbit is pathognomonic of suppuration in the petrous pyramid. They said "The pain is on the side of the lesion. It is limited to the region about the eye and is felt within the orbit itself. It is described as a deep seated ocular pain and, at the onset, is nocturnal in character. During the day the patient is more or less comfortable, but, as evening comes on, the pain becomes more and more intense. The patient describes it as being 'just above the eye and through the eyeball'." Other branches of the fifth nerve besides the first may be involved if the inflammatory reaction is sufficiently widespread. Pain will then be felt all along the area supplied by the second and third branches. This pain is not diagnostic, however, as it can be associated with cases of uncomplicated middle ear abscess and mastoiditis." As the second member of their diagnostic triad, Kopetzky and Almour mentioned continued aural discharge "After a period during which the middle ear remains dry there suddenly reappears a profuse aural discharge as a source of which the mastoid wound can be definitely ruled out for it appears healthy and contains no pus. As the suppuration in the mastoid process and middle ear clears up the suppurative process spreads into the perilymphatic tracts toward the pyramid." The third member of the triad is the period of low-grade sepsis. With regard to their cases Kopetzky

and Almour (41) stated "On an average the temperature was low in the morning, between 99 and 100° Toward the late afternoon it would rise to 101 to 102°." As corroborative evidence of suppuration in the petrous pyramid, they mentioned facial weakness, vertigo and nystagmus, and vomiting. They emphasized especially the period of quiescence, which they said is produced by the relief of tension afforded by the rupture of the abscess through the wall of the petrous pyramid. They said "In most of our cases there occurred an interval of freedom from all pain of diagnostic import. This period of quiescence varied from five to nineteen days. Before proceeding further it must be repeated that the pain to which we are referring is the deep seated eye pain associated with a low grade sepsis. As previously shown, the presence of trigeminal neuralgia alone or of pain not limited to the first branch of the trigeminal nerve in no way serves as a diagnostic symptom of petrosal tip suppuration. Therefore, the presence and subsequent disappearance of pain in the areas supplied by the second and third trigeminal branches do not create what we designate as the period of quiescence. We refer only to the presence of deep-seated eye pain in the company of low grade sepsis and to the subsequent abatement of this pain. When the abscess has ruptured through the cortex and an extradural abscess has formed, the pain does not recommence until a generalized headache ushers in a terminal meningitis." As to the question of paralysis of the abducens nerve, Kopetzky and Almour stated that, according to their experience, this palsy in the course of otitic suppuration is due to a mild type of meningeal inflammation, and that most patients who present the Gradenigo syndrome recover completely.

This section of their article on diagnosis is open to discussion as the weight of accumulating evidence has shown that there is no definite syndrome of petrositis. The cardinal symptom of retro-orbital pain, when present, is significant of suppuration in the apical region alone, and not of suppuration elsewhere in the petrous pyramid. The statements that petrositis develops as the process in the middle ear and mastoid is subsiding and that the diagnostic signs appear only after a previously performed mastoidectomy have not been confirmed by experience. In fact Kopetzky and Almour themselves point out that petrositis is a complication, not of mastoiditis, but of otitis media. Their denial of the validity of irritative signs in the second and third branches of the trigeminal nerve, together with their insistence on the pathognomonic significance of retro-orbital

pain, have not stood the test of time. In many cases of suppuration in the petrous pyramid, retro-ocular pain is absent. While this symptom is significant when present, possibly more significant than other evidences of irritation of the trigeminal nerve neither its absence nor its presence deserves the unique value which Kopetzky and Almour attributed to it. Their summary dismissal of the importance of palsy of the abducens nerve also seems somewhat didactic. Rather than complete recovery of most patients with Gradenigo's syndrome the statistics in the literature show that the mortality of this condition is 20 per cent (58). Baldenweck demonstrated that the mortality in cases of Gradenigo's syndrome is due usually to suppuration in the petrous apex. At the time of writing Kopetzky and Almour were apparently unaware of the occurrence of virtually symptomless suppuration in the petrous pyramid especially with involvement of the jugular bulb group of cells.

The third section of the paper by Kopetzky and Almour is devoted to the surgical technique developed by Almour for draining the suppuration in the petrous apex. Almour said: "Where a case of petrous pyramid suppuration has been diagnosed either before or after surgery upon the mastoid process, the inner table of the mastoid process must first be inspected. He advised that after a complete, simple mastoidectomy a careful inspection of the sublabrynthine region and the postlabrynthine regions be made to find the path of invasion. 'The latter appears as a fistulous opening with granulations around the mouth. If it is probed a flow of pus almost always follows.' When in Almour's cases nothing was found radical mastoidectomy was performed and the inner wall of the antrum and of the epitympanic space were searched for a fistulous opening leading into the petrosa. If nothing could be found the overhanging anterior external auditory canal wall and zygomatic root were removed to bring the orifice of the eustachian tube into full view. The processus cochleariformis and tensor tympani muscle were next removed in order to expose the true roof of the musculotubular canal. A 1 or 1.5 millimeter dental bur was then advanced 5 millimeters toward the tip of the pyramid immediately underneath the superior surface of the petrosa at an angle of from 20 to 25 degrees with the axis of the external auditory canal. The route passed between the basal coil of the cochlea and the carotid artery. Almour pointed out the necessity of starting the bur as near the superior surface of the petrosa as possible because the coil of the cochlea and the carotid artery turn away from

one another from below upward, thus increasing the available space as the superior surface of the petrosa is approached. After the drill had been advanced to a depth of 5 millimeters, a probe was cautiously inserted and any fibrous adhesions present were broken up. A spurt of pus followed the withdrawal of the probe. For cases in which there are signs pointing to the presence of an epidural abscess or the roentgenographic examination reveals a break in the contour of the petrous apex Almour advised exploration by the subdural route. The conservative surgical advice preceding his description of his special technique is excellent, but unfortunately many readers seem to have overlooked the directions to inspect the periphery of the labyrinth before performing a radical operation and to inspect the inner wall of the antrum and epitympanic space before proceeding with invasion of the apex. The technique of opening the apex presents more pitfalls for inexperienced surgeons than that proposed by Eggleston and does not give complete exposure of the surfaces of the pyramid. Nevertheless it is a distinct addition to the surgery of the petrous apex.

In a paper on the roentgen findings in suppuration of the petrous apex, Taylor (74) advised the use of the base plate to contrast the 2 pyramids simultaneously and an anteroposterior oblique projection of each petrous pyramid separately to locate a change in density or localize an area of destruction along the superior surface of the petrous pyramid. He stated: "One of the earliest findings in petrous pyramid suppuration is a marked diminution in aeration with loss of trabeculations. This change is followed by a decalcification or atrophy of the apical portion, the contour of the apex remaining intact. With progression of the lesion there is a perforation and destruction of the contour of the apex. In the presence of clinical symptoms pointing to petrous pyramid suppuration, these findings are very significant and indicate operative interference. If the petrous tip is not pneumatized, the above changes do not take place." This article is a complete summing up of the diagnostic possibilities of roentgenography.

Lillic in 1931 remarked: "That a cranial nerve is affected may be assumed to indicate that intra-cranial extension has taken place. The lesion affecting the nerve may be due to congestion to localized inflammation of the dura to localized abscess formation, to diffuse serous or suppurative meningitis or to none of these causes." He considered that when any of these signs is present it should be given consideration, but that no such sign is in itself diagnostic of a definitely localized

lesion. He quoted Pet as stating that homolateral dilation of the pupil is the most important sign of suppuration in the petrous apex. Illie reported a case with severe pain in the mandibular division of the fifth nerve in which the pain ceased after removal of the bone over a reddened Trautman's triangle cell in the zygomatic root and in the posterior wall of the canal. Of 11 patients with Gradenigo's syndrome, only 2 were subjected to operation. In both of the latter the perilymphatic cells were found involved. Nine patients recovered without operation. Twelve cases of facial paralysis were observed. In the majority the paralysis was associated with chronic otitis, but in 3 it occurred in acute mastoiditis without evident involvement of the petrous. Involvement of the vestibular branch of the eighth nerve was found in 4 cases of acute otitis media. Illie observed also 3 cases of involvement of the seventh and eighth nerves together, with alarming signs of meningitis. At operation, the labyrinths were opened. They were apparently not involved, but the dura over the apex was very red. It is possible that the Neuman operation drained an infected apex in these cases. In 1 case in which the jugular foramen syndrome was present it is associated with acute mastoiditis. Its disappearance when a lateral pharyngeal abscess was drained was thought to indicate extension from the under surface of the petrous pyramid. Illie expressed the opinion that involvement of any cranial nerve is of considerable significance but does not indicate operation unless other signs and symptoms are present.

Druss, in 1931, reviewed the anatomy and pathology of petrositis. He found that the anatomic situation in the petrous apex is the same on the two sides in almost all instances, but that the structure of the mastoid and of the petrous apex is likely to differ. He stated that an infection in the perilymphatic cells may break through the cortex of the pyramid anywhere along its course and produce a localized extradural abscess, a subdural abscess, a brain abscess, or generalized meningitis. This fact is important in disease of the petrous pyramid, and should tend to prevent preoccupation with the apex alone.

Alpin described a case of acute diffuse otogenic osteomyelitis of both temporal bones of a child aged 13 years. On the right side, which was operated on first, almost the entire pyramid and the adjacent petrous and occipital bones were involved as well as the mastoid process. A radical mastoidectomy was performed with removal of the labyrinthine capsule, the greater part of the pyramid, and the involved portion of the nearby

bones. The cerebellar dura was torn during the procedure. Four days later a somewhat less extensive operation was done on the left side, but the sigmoid sinus was found thrombosed and was ablated, the exposed wall being cut away. The jugular vein was not ligated. The patient recovered. This was probably a case of the disease which Almon described as "osteomyelitis of the mastoid of infants and children," and which Lighton (16) discussed as "acute hemorrhagic osteomyelitis" and believed to be rare after the age of 10 years. The case is of interest as it demonstrates what may be accomplished in an apparently hopeless condition. A similar case in which the outcome was fatal was reported by Brock. Alpin's article includes a review of the literature.

Illie and Williams, in 1932, reported 2 cases of petrositis and suggested that the preferred method of attack is along the cell tracts by which the disease has advanced into the petrous pyramid. They stated that instead of a casual inspection for the presence of suppurating fistula a definite search for cell tracts should be made. In the 2 cases reported the infected regions of the pyramid were drained through tracts which were found and radical mastoidectomy was unnecessary. It seems probable that in the cases of suppuration of the pyramid which will not respond to this type of surgical approach are few, and that other techniques should be resorted to only when this method has failed.

In a discussion of osteomyelitis of the skull originating in the temporal bone, Wilensky pointed out the marked clinical similarity between disease of the pyramid and disease of the sphenoid bone. He stated that in cases in which acute pneumitis and otitis media are associated it is extremely difficult to be sure whether intracranial symptoms are produced from the apex of the pyramid or from the sphenoid, and that in cases of suspected petrositis the possibility of osteomyelitis of the body of the sphenoid should be considered.

Wilson, in 1932, pointed out that the cells at the tip of the petrous pyramid are not comparable to the pneumatic cells in the mastoid. He stated that he had failed to find pneumatic cells in the temporal bones of 20 children, and expressed the opinion that true pneumatic cells are rare even in adults. In his studies he found that the large diploid spaces may be easily mistaken for pneumatic cells, especially in sections as the marrow is easily dissolved when sectioning is done.

Trickett, in 1937, reviewed the problem of petrositis from the anatomic and pathologic standpoint. He agreed with Lighton that the lesion in the apex is a combination of osteomyelitis and osteitis. In his cases he removed the cancellous



tissue in the angle between the horizontal and superior vertical canals and then entered the apex through the arch of the superior semicircular canal using a 1 millimeter curet with a flexible or bent handle. A septic focus could be recognized if the curet touched pus or lumps of necrotic tissue. When pus or necrotic tissue were found they were scraped away in an attempt to discover a cavity with firm walls. Such a cavity was then drained with a fine rubber membrane tube which was changed daily. At the same time a small scoop was used to clear the entrance of the semicircular canal as well as the region nearest in the cavity in order to prevent accumulation of waste matter.

Vail in 1933, suggested that the pain in suppuration of the petrous apex is due to irritation of the great superficial petrosal nerve. He demonstrated that the anatomic course of the nerve exposes it to irritation in this condition. He pointed out also that the so-called first division pain in petrositis occurs in only a portion of the distribution of the first division, that an abscess involving the gasserian ganglion produces no pain, and that the distribution of the pain in petrositis is somewhat similar to the distribution of the pain in so-called 'vidian neuralgia'. He presented a strong argument for his theory, but failed to answer the following questions which are often asked also with regard to vidian neuralgia: Are there sensory fibers in the vidian nerve? If this nerve does not contain sensory fibers will a parasympathetic nerve transmit sensory impulses? Most anatomists and physiologists answer these questions negatively, but not wholly convincingly.

Lange studied 20 cases of inflammatory foci in the petrous pyramid both clinically and anatomically, and 6 cases only clinically. Palsy of the abducens nerve occurred in 4 of the 6 cases in which recovery ensued, but in none of those with a fatal termination. Lange expressed the opinion that the best surgical technic is usually a circumlabyrinthine approach to the source of infection but that when the labyrinth is involved in the suppuration or pronounced meningitis is present the translabyrinthine approach is preferable.

In a consideration of the problem of suppurative meningitis secondary to petrosal suppuration, Lawson stated that draining the suppurative focus in the petrous pyramid is not always sufficient to prevent propagation of the disease to the meninges. He found that the subarachnoid cisterns most frequently involved in otitic meningitis are the cisterna interpeduncularis, the cisterna chiasmatica and the cisterna fossae Sylvii. He believes that the first response of the body to meningitis is an increase in the quantity of cerebrospinal fluid

to dilute the toxins. The increased fluid tends to accumulate in the basal cisterns, and in a severe inflammatory infection tends to become walled off. After this has occurred it is impossible to establish adequate drainage from a single point of outflow. It is essential to establish drainage as early as possible and to drain from the deep cisterns as well as from the surface. Collapse of the meninges with partial obstruction can be prevented by the intravenous injection of hypotonic fluids which increase the production of cerebrospinal fluid as much as 10 times. Lawson cited with approval Kerrison's method of packing off the lateral sinus and draining the larger cisterna through its inner wall. He concluded "All indirect methods such as intracarotid therapy will continue to be ineffective when the primary infecting focus is not rendered inactive."

Loss (84), in reporting his results in 12 cases of petrositis recommended following the petilabyrinthine cell tracts. For cases in which this does not result in drainage of the infected foci, he recommended radical mastoidectomy and invagination of the petitubal and infracochlear (hypotympanic) cell tracts.

Ramadier, in 1933, published a monograph on deep osteitis of the pyramid. In an introductory chapter on osteomyelitis of the temporal bone he discussed both the hematogenous and the otogenous forms. On clinical grounds he distinguished osteomyelitis of the temporal bone from osteitis. He said: "One may object that all osteitis is in reality an osteomyelitis, for there cannot be osteitis without inflammation of the marrow of the bone. The first (osteomyelitis) has for its fundamental anatomic substratum an extensive marrow structure, it is characterized clinically by an acute evolution and by marked general reactions; it appears consequently to be very close to the common osteomyelitis of the long bones and for this reason should be designated 'osteomyelitis of the temporal bone'. The other (osteitis) corresponds to relatively circumscribed osseous lesions, which evolve slowly, without marked effect on the general condition and in the propagation of which the medullary factor remains of secondary importance or of a very moderate activity to this form quite distinct from the preceding is applied the term 'osteitis of the temporal bone'." This clear statement should terminate the rather vain argument with regard to whether the surgeon is dealing with osteomyelitis or osteitis of the temporal bone in the presence of these infections. Ramadier's theory corresponds to the theory of Eagleton (15, 16), but is more clearly presented.

Ramadier limited his main discussion to "osteitis" of the petrous pyramid. He believes that pneumatization of the pyramid is the principal factor in the pathogenesis of the lesion, and that the "diploetic" type of osteitis in which the infection is carried from place to place by the marrow is rare. He expressed the opinion that hematogenous propagation of the disease is more likely to produce periapical complications than disease in the apex itself. However he described a type of closed petrositis in which it was impossible, even microscopically, to find a perilabyrinthine cell tract connecting the disease focus with the middle ear. He described this finding to healing and osteosclerosis as the lesion advanced toward the apex. He discussed with great clarity the anatomy of the perilabyrinthine region according to Moutret, Lafitte-Dupont, and Girard, and was the first to suggest the terms "anterior petrositis" and "posterior petrositis." He cited 6 perilabyrinthine regions in which cell tracts may be found. With regard to symptoms, he said that in his opinion some form of neuralgia of the fifth nerve is almost constant in petrositis, but that retro-ocular pain, although important, is neither necessary for diagnosis nor pathognomonic of the lesion. He attributed considerable importance to paralysis of the nerves, especially paralysis of the abducens nerve. He stated that he had never observed a regular period of sepsis, and believed that the temperature curve is of only slight diagnostic significance. With regard to surgical attack on the lesions in posterior petrositis he advised investigation of the perilabyrinthine cell tracts, but for the surgical treatment of anterior petrositis he advised exenteration of the petrous apex with removal of the zygomatic root, exposure of the hypotympanum by removal of a large part of the tympanic bone, and then entrance to the apex with a curet at the tubal orifice. Contrary to the belief of some, he did not recommend removal of a part of the upper jaw. Of 4 cases in which he used the described technic, recovery resulted in 3 although apparently in the latter curettage of the perilabyrinthine tracts was necessary after the operation. This monograph by Ramadier is the most complete critical review of the literature that has been published to date. The presentation is clear and the reasoning logical. It is particularly good in its consideration of anatomy, pathology, and symptomatology.

Kopetzky, in 1933, published a paper on the problems concerned with empyema of the petrous apex. On the basis of Wittmack's theory of pneumatization he attempted to prove that in a pneumatized pyramid there is complete replace-

ment of the myelin tissue by pneumatic cells. However, his findings appear to be at variance with those of many pathologists who observed only partial replacement in most specimens, and he produced no proof of his theory. The anatomists he quoted in support of his contention found nearly half of the petrous pyramids to be of the mixed pneumatic diploetic type. After recapitulating the arguments in his previous paper, he considered the other surgical procedures proposed. Concerning the suggestion made by Lillie and Williams that intracapsular exploration of the perilabyrinthine tracts is the technic of choice in most cases Kopetzky said "This technic is applicable only to cases with a lesion in the epitympanic space. They are often misquoted as using this method for all types of cases." As a matter of fact Lillie and Williams recommend this method for cases of all types except those of "closed petrositis," in which it is impossible to uncover perilabyrinthine cell tracts. Kopetzky's criticism of the technic of Freckner is valid, and except for his objection to the fact that Freckner's method does not afford dependent drainage—a disadvantage that obtains with his own technic—it is just. His objections to the technic of Ramadier were that it opens up the carotid canal to infection, that the carotid artery may block off drainage from the apex, and that the operation disturbs the function of the mandibular joint. However, his belief that drainage may be blocked off by the carotid artery has apparently not been borne out by experience, and the post operative interference with the function of the mandibular joint is only temporary and certainly no more than that following Eagleton's operation. Moreover, Ramadier's technic makes it possible to eviscerate the petrous apex. Kopetzky criticized Eagleton's (16) technic in the belief that Eagleton advocated it for all types of cases, whereas Eagleton suggested it only for cases of apical petrositis in which basal (pontile) meningitis is present. For less serious cases he expressly advised investigation of the probable route of invasion. Kopetzky argued that the classical gasserian ganglion approach is less disfiguring than the Eagleton operation. However, it appears that this would be beside the point in a matter of life and death, and that the operation of Eagleton gives an excellent cosmetic result except in the cases of baldheaded persons. Kopetzky advocated exposure of an extradural abscess at the apex by removing the tegmen after an ordinary radical exposure and then elevating the dura. The difficulties produced by insufficient exposure, a contracted field, and a dura softened by disease can be appreciated best by those who have at-

tempted this procedure. In his criticism of the Eagleton technic because it produces a drainage tract that may become closed by pressure of the overlying dura Kopetzky is justified. He stressed the fact that Eagleton operates for osteomyelitis of the apex, while he himself operates on a closed empyema, yet on reading his and Eagleton's case histories one is more struck with the similarity of the types of cases presented than with the differences between them. Ramadier's argument as to the clinical differentiation of "osteitis" and "osteomyelitis" of the apex is germane to this discussion.

Taylor (75), in discussing the roentgenologic problems of suppuration of the petrous pyramid, summarized his paper as follows: "Roentgenographically the pneumatic petrous pyramid shows variations from the normal when an otitic infection is present. These variations do not always indicate a suppurative lesion of the petrous apex. The roentgen appearance of acute coalescent petrositis or empyema of the petrous apex is that of diminished aeration, halisteresis of the apex, loss of trabeculation and sometimes solution of continuity. There is no roentgenologic distinction between the acute and subacute types of coalescent petrositis; the differentiation is clinical. Chronic petrositis shows productive changes in the apex."

In discussing the anatomy and pathology of the petrous bone, Hagens reported that, of 50 bones he found pneumatic cells in the apex in 34 per cent and that pneumatic spaces not extending to the petrous apex were often discovered about the canals and vestibule. Marrow was found in the petrous bone in 94 per cent of the specimens, and Hagens believed it might have been overlooked in the other bones because of incomplete examination. He stated "It was evident that marrow alone could exist in the petrous apex but that when pneumatic spaces were present there, marrow also was found." He emphasized that the petrosa may be extensively involved in a case of ordinary, simple chronic otitis media, and that in ordinary acute otitis media the petrosa if pneumatized may be extensively involved. Of interest in connection with the problem of dangerous sites and those not dangerous for perforation of the drum in chronic otitis media is his finding that, in perforation of the membrana tympani in any location, the epidermis is able to grow around the "corner" onto the inner surface.

Glick noted pneumatization of the petrous apex of a negro aged 13 years and pneumatic cells in the apex of one temporal bone of a child aged 5 years. He found a marked reaction of the marrow

cells even in cases in which there was pneumatization in the petrous apex.

Myerson, Rubin, and Gilbert (55) reported the results of a study of the temporal bones which they made as a routine procedure in 100 necropsies. They found the arrangement of the cells to be that described previously, but were able to discover pneumatic cells in the petrous apex in only 11 per cent of the pyramids examined and in only 2 specimens in which cells in the peritubal area led to the petrous apex. They found red bone marrow without pneumatization, and a sclerotic petrous pyramid without marrow but between these two extreme types, mixed pneumatic and marrow cells were always present. In 4 of 100 skulls the petrous apex was pneumatized on one side and not on the other. The measurements from the superior semi-circular canal to the tip of the apex varied from 1.1 to 4.5 cm, and averaged 3.2 cm. In an attempt to establish landmarks on the superior surface of the petrous pyramid they found the following arrangement to be constant: an elevation then a depression, then a second elevation, and then a second depression. The first elevation corresponds to the superior semicircular canal, the second elevation to the roof of the internal auditory meatus, and the second depression to the petrous apex.

Sjoberg reported 4 cases in which there were definite symptoms of apicitis with orbital pain and a febrile course developed after mastoidectomy. In all, the diagnosis was confirmed by roentgenograms and the patient recovered without an attempt to drain the petrous apex. Sjoberg expressed the opinion that the retro-ocular pain in petrositis is produced by irritation of the abducens nerve which receives fibers from the recurrent ophthalmic nerve of Arnold.

Greenfield (30) reported 2 cases with the syndrome described by Kopetzky and Almour (41), the patients recovered in about 2 months without the performance of an operation. Both of them had a profuse discharge from the tympanum. Greenfield believes that when free discharge from the petrous apex through the tympanic cavity is present, operation is more dangerous than an expectant attitude.

Roberts reported 4 cases of petrositis. In 2, recovery followed complete mastoidectomy. However, there is some doubt as to the correctness of the diagnosis of petrositis in the latter.

Ruskin presented the hypothesis that, in addition to the syndrome of Gradenigo, a syndrome of edema of the lower lid on the involved side, temporomandibular orbital pain, and trismus is diagnostic of suppuration in the petrous pyramid. He

reported the findings of a detailed study of the venous circulation in and about the petrous pyramid

Kroehnle and Kuhlmann described a slight modification of the ordinary base plate which they believed brings out pathological changes with unusual clearness

Fowler reported observations made at necropsy in the case of a patient who had died of meningitis. The observers were unable to make out any gross difference in the appearance of the petrous pyramids. However, on microscopic examination the cells on the involved side were found filled with purulent exudate consisting of large mononuclear cells and occasional polymorphonuclear neutrophils. Fowler said "After all, the surgeon sees the lesion grossly and in this case he would have found no creamy pus and he would have found no necrotic bone. With the hemorrhage always present in mastoid operations, this bone would have looked perfectly normal to him."

Myerson, Rubin, and Gilbert (57) advised removing the bone of the cortex over the fistula and making a trough of the previously existing fistulous tract when, in cases of suppuration of the petrous pyramid, a fistula is found above the plane of the horizontal semicircular canal, external (lateral) to, or above, the plane of the superior semicircular canal and beneath the cortex of the anterior surface. In the cases they reported the dura was elevated before the bone was removed, and a wedge of bone which included most of the anterior surface of the petrous pyramid from the postero-superior border to the carotid canal was removed. The cortex and the underlying bone were found softened by disease.

Greenfield (29) reported the occurrence of bilateral palsy of the abducens nerve with bilateral choked disks in a case of thrombophlebitis of the lateral and sigmoid sinuses. As there was no bleeding either from the bulb or the upper knee, he believed that both the inferior and superior petrosal sinuses were blocked, and that the blocking produced an inflammatory reaction in the dura causing pressure on the abducens nerves such as was previously described by Eagleton (15).

Bricker reported a case of apical petrositis in which operation performed by the Almour technic was followed by recovery. Smith reported a case with symptoms of petrositis complicated by a temporosphenoidal abscess in which raising the dura over the superior surface of the petrous pyramid liberated a large extradural abscess.

Sunde, in discussing the symptoms of petrositis, expressed doubt as to the serious prognostic importance of the latent period which was stressed

by Kopetzky and Almour (41). He believes that if the regression of the eye pain and low-grade sepsis is accompanied by a marked increase in the purulent discharge from the ear, it suggests that the pus has broken through into the middle ear rather than through the apex of the pyramid, and that when this has occurred it is wiser to await recovery than subject the patient to an immediate operation. For cases in which operation seems imperative, he advised exploration for perilymphatic fistulas, and if no fistulas are found, exploration of the apex by the technic of Eagleton.

Myerson, Gilbert, and Rubin (54) reported a modification of Eagleton's technic for uncapping the petrous apex in the presence of a closed empyema in the region, which did not necessitate radical mastoidectomy. A vertical cutaneous incision was made about 2.5 centimeters upward from the upper attachment of the auricle and a large section of the squamous bone then removed. The removal of bone extended down to the zygoma anteriorly and to the knee of the sigmoid sinus posteriorly. The piece removed was approximately 4 centimeters in diameter. In addition, the tegmen of the mastoid was removed and a part of the tegmen tympani as far as the prominence of the superior semicircular canal. Elevation of the temporal lobe was first carried out along the superior surface with care to keep close to the superior border of the pyramid. In the process of separation some resistance was encountered along the superior border from the prominence of the superior canal inward as far as the internal margin of the internal auditory meatus. The latter point, where the resistance decreased, marked the beginning of the apical region. The landmarks on the superior surface of the pyramid have been mentioned previously. The apex was opened by an especially designed angled gouge. On first consideration this operation appears to be an excellent modification of the original Eagleton technic, but because of the limited exposure it is a better descriptive than operative procedure. Moreover, it appears that when so radical an operation seems necessary it would be better surgical judgment to inspect the epitympanic, hypotympanic, and petrotubal regions for fistulas. Eagleton (15) restricted the use of his technic to cases of actual or impending meningitis, in which regard for the hearing would be out of place.

In a consideration of differential diagnostic data on specific types of suppuration in the petrous pyramid, Kopetzky (40) divided disease in the petrous pyramid into 2 forms, osteomyelitis and coalescent osteitis. He quoted Ramadier's description of the 2 forms of osteomyelitis (hema-

toxic and otogenic) with approval. He then departed from Ramadier's theory that the difference between osteitis and otogenic myelitis is clinical, and set up the case of hypothetical coalescent osteitis of the petrous pyramid. However, he failed to prove this type of lesion by histologic evidence. He stated that the presence of such a lesion is indicated by the presence of intra orbital and supra orbital pain. He discussed the differential diagnosis between this pain, indicative of "petrositis," and the pain of sinus thrombosis, temporosphenoidal abscess, and supratentorial meningitis. He then intimated that certain symptoms suggest the localization of the lesion in the perilyabyrinthine region. He suggested also that fistulous tracts in the posterior perilyabyrinth are best reached by complete mastoidectomy, but that lesions in the anterior perilyabyrinth can be reached only by radical exposure of the tympanic cavity. In his classification and surgical suggestions he followed Ramadier closely.

Friessner, Druss, Rosenwasser and Rosen reviewed the symptomatology of petrositis and again pointed out that the process may rupture through the cortex before it reaches the petrous apex. In 75 per cent of their specimens, they found a mixed diploic and pneumatic type of development, and in 19 of 24 cases, they noted that the pathway of extension was along the posterior surface of the labyrinth. They remarked, "It cannot be stated too emphatically that not all lesions in the petrous pyramid extend to the apex. In the majority of our cases the greatest expression of the disease process was noted in the petrous pyramid between the superior semicircular canal and the internal auditory meatus." With regard to the symptom of pain, they stated that they had found its presence of much greater importance than its localization. According to their experience, the belief that serious disease in the petrous pyramid is always associated with persistent or recurring otorrhea is erroneous. They believe that the late development of palsy of the abducens nerve is extremely suggestive of a lesion in the petrous pyramid and that the presence or absence of sepsis of low grade is of little diagnostic importance. They pointed out that disease in the perilyabyrinthine structures may invade the labyrinth. They advised a careful search for perilyabyrinthine tracts after the performance of a complete mastoidectomy. In many of their cases they found complete mastoidectomy inadequate. When it was unsuccessful, they employed the Eagleton technic. With regard to the indications for exploration of the petrous pyramid, they stated that if symptoms suggestive of petrositis are present

before mastoidectomy is done or if meningitis sympathica not sufficient to explain the symptoms is found during the course of complete mastoidectomy, the pyramid should be explored immediately. It should be explored also in cases treated by mastoidectomy in which the symptoms continue after the drum and the mastoid wound have healed. This is one of the most logical papers in the literature, and is especially valuable in its indications for surgical interference with the pyramid.

Coates, Ersner, and Myers emphasized that, in cases of acute mastoiditis, changes in the petrous pyramid may sometimes be demonstrated by routine roentgenograms, but that these changes are not indicative of need for surgical interference on the pyramid. For cases with symptoms of petrositis and a well pneumatized mastoid, they advised the expectant attitude as in such cases adequate natural pathways for drainage are usually present.

Toback (76) reported the findings of an interesting roentgenographic study of the structure and development of the perilyabyrinthine cell tracts and petrous apex.

Taptas, in 1935 published an account of 3 cases of osteitis, 2 of which exploration was performed by the perilyabyrinthine route. One of the latter was fatal, but the other, in which evulsion of the apex was carried out by the technic of Ramadier, terminated in recovery. Taptas expressed the opinion that if signs of petrositis appear at the start of otitis, myringotomy should first be given a trial. If this is unsuccessful in relieving the symptoms, complete mastoidectomy should be performed and a search made for perilyabyrinthine cell tracts. If the second procedure fails to relieve the symptoms, the procedure of Ramadier should be followed.

Evans reported 8 cases of complications of otitis media which involved the petrous pyramid. However, they included cases of labyrinthitis, and it appears that only 1 of them was a case of petrositis as that condition is usually defined. The patient with petrositis recovered without exploration of the petrous pyramid.

Gruppe reported a case of petrositis in which drainage was established by following a fistulous tract which led to the apex through the arch of the superior vertical canal.

Egleton (18) stated that pyogenic inflammation of the petrous apex or the sphenoidal basis runs a different course and requires a different surgical viewpoint than that of infection of an adjacent cranial bone such as the mastoid because, in contradistinction to the other bones of the skull, the sphenoid, the occipital and the 2 petrous apertures, which form the primordial basis of the

skull in infancy and childhood, contain red bone marrow. At osseous maturity the red bone marrow is converted into yellow bone marrow, but the presence of infection causes metaplasia into red bone marrow. Eagleton believes that through this process of metaplasia, pneumatic spaces in the pyramid may also be changed into spaces containing red bone marrow. Consequently, the petrous apex does not combat infection by simply pouring out polymorphonuclear leucocytes, the red bone marrow cells also take part in the defense reaction. This phenomenon, together with the increased blood supply in the marrow, accounts for the clinical course of petrositis and explains the rarity of the formation of sequestrums in that condition. Eagleton stated that he had observed this phenomenon of metaplasia at postmortem examination in at least 2 cases. He proposed a clinical classification of infections of the petrous apex into "(1) reactive and reparative osteitis, (2) non suppurative congestive cases—symptoms due to venous stasis, (3) chronic bone sepsis cases (without macroscopic pus), (4) abscess of the apex (a) without a tract, (b) with a tract, (5) acute septicaemic cases associated with a continuous positive blood culture and meningitis." This classification seems somewhat more an anatomohistologic than a clinical classification. Eagleton added a new symptom of petrositis, the intrameatal type of facial palsy which is transient in duration and limited in extent. His article is an elaboration of his original thesis of the pathologic conditions present in suppuration of the petrous apex.

Jones emphasized the importance of the pneumatized perilabyrinthine tracts in surgery of the petrous pyramid.

Toback (78) described 4 principal pathways of cellular advance around the labyrinthine capsule. The first, the posterior pathway, originates in the antrum, the second, the superior, comes from the recessus epitympanicus, the third, the inferior, originates in the hypotympanic recess and advances along the inferior surface of the pyramid, and the fourth extends first to the lower wall of the osseous eustachian tube and may advance into the petrous apex posterior to the carotid canal. Because of these different routes of advance, he believes that there can be no single operation applicable to all cases of petrositis. In a later article (77) he stated that 50 per cent of deaths from otologic disease are due to petrositis.

Myerson, Rubin, and Gilbert, in 1935, emphasized the importance of searching for fistulas. In their summary of surgical management the suggestions as to the proper procedure are almost exactly those made by Baldenweck 26 years ago.

In discussing the symptoms of petrositis, Eves expressed the opinion that the continuance of a profuse discharge from the ear after mastoidectomy or its re-appearance from 2 to 6 weeks after the operation is strongly suggestive of suppuration in the petrous pyramid, especially if it is accompanied by elevation of the temperature and pains around the eye. He described the pain as being characteristically in and about the orbit, but stated that it is sometimes referred to the occiput of the affected side. He said that he had found the temperature to be of an intermittently septic type which drops to normal for periods of several days and that he regarded the changes in the blood picture and the roentgenogram as of only secondary diagnostic value. He mentioned nystagmus, nausea, vomiting, and facial palsy as transitory symptoms, and expressed the opinion that paralysis of the sixth nerve is an exceptional rather than a constant sign.

In an extremely interesting and valuable paper, Eagleton (17) presented the hypothesis that a clear understanding of infections of the bones of the skull requires knowledge of the embryologic development of the several types of bone. He divided the bones of the skull into neurocranial and facial, and subdivided the former on the basis of structure and function into (1) cranial vault bones, (2) special sense bones, (3) passively protective bones, and (4) biocellular actively protective bones. He drew surgical applications from this consideration of the embryology of the cranial bones, and in applying it to suppuration in the petrous pyramid he said: "The exemption of the compact bone of the neonatal labyrinth from infection does not apply to the perilabyrinthine areas which are formed of secondary appositional bone. For the cancellous bone of the incomplete peripheral shell that develops during the first two years of life may be the seat of a long suppurating sinus. Such a fistula may (1) extend above, (b) behind, or (c) below the labyrinth and may (d) enter the petrous apex. Consequently, in cases presenting symptoms of apical irritation the surgeon during the operation should thoroughly investigate the bone (1) within the solid angle of the petrosal, (2) above the eminentia arcuata, as well as in (3) the supratubal region before perforating into the apex itself. For if the external orifice of a fistula be found, it will furnish a tract to that part of the apex which is the site of the suppuration." The theories propounded by Eagleton in his discussion of the fundamentals of suppuration occurring in the bones of the skull should prove of great aid to all physicians dealing with suppuration of this type.

In a symposium before the American Otological Society, Kopetzky (43) insisted that the type of suppuration of the petrous pyramid under discussion can take place only in completely pneumatized bones, and that if myelin tissue is present, it is not involved in the suppurative process and the lesion should be designated "coalescent osteitis." He said also that specialized techniques are usually unnecessary and should not be employed routinely in all types of cases as it is advisable to suit the treatment to the problem presented by the individual case. He insisted that surgical therapy should reach the infective focus. Treatment which does not do this he characterized as futile rather than conservative.

In discussing the gross anatomy of the petrous pyramid, Guild (43) contended that most of the confusion in regard to relationships in and about the petrous pyramid is due to confusing terminology and anatomic variation. He therefore suggested using the invariable otic capsule as a reference point in terminology. He stated that he had found the distance between the ascending part of the carotid canal and the anterior part of the cochlear capsule to be exceedingly variable, depending on the presence or absence of marrow cells in that region. He expressed the opinion that no one had taken full advantage of all the relations of the petrous pyramid for diagnosis. He called attention to the fact that the petrous pyramid is in relation to the fifth to the eleventh cranial nerves inclusive and in addition, to the greater superficial petrosal nerve, the lesser superficial petrosal nerve, the chorda tympani, and internal carotid sympathetic plexus. He called attention also to the relation of the pyramid to the lateral aspect of the vault of the nasopharynx. In considering the venous channels about the petrous apex, he stated that in his opinion they are of importance chiefly because they receive small vessels from the parts of the petrous pyramid near them. On the basis of their developmental origin he divided the perilymphatic cells into 4 main groups: the tubal, the hypotympanic, the epitympanic, and the antral. He stated that from each of these 4 regions the pneumatized cellular extensions may extend into any region of the so-called petrous apex. From his paper it may be seen that a "syndrome of petrositis" is logically impossible, and that diagnosis depends upon a process of integration of symptoms. It is evident also that knowledge concerning the origin of cell tracts is of much less importance surgically than knowledge concerning the regions that cell tracts are apt to occupy in the perilymphatic

In discussing the microscopic anatomy of the petrous pyramid, Jones (43) stated that complete pneumatization of the pyramid is very rare although partial pneumatization is not uncommon, and that petrositis develops in only a small percentage of persons with a pneumatized petrous pyramid and in these is seldom fatal. In sections which he studied microscopically it was clearly shown that infection of the pneumatic spaces involves the marrow and tends to decrease toward the limits of the perilymphatic cells.

Wilson (43) reported that he had made a histologic study of the petrous tips of 50 children from 5 weeks to 15 years of age because, according to his experience, it is at this period of life that petrositis is most common. He found no evidence of pneumatization in any of the specimens studied, and came to the conclusion that infection at the tip progresses most frequently through vascular channels from the ear and is an osteomyelitis which may be acute or subacute or of a chronic type which often undergoes acute exacerbations. Since the bone marrow is a part of the reticulo-endothelial system it plays a definite part as a defense mechanism in these infections. Wilson stated he had yet to observe a case of otitis media or basal meningitis in which there was evidence of an irritative reaction in the marrow cells. It is probable that pneumatic cells should not be expected before the fifteenth year of age as Myerson and his associates (55) found only 1 pneumatized pyramid in children under that age. Moreover, many cases of petrositis in persons older than the age set by Wilson as the upper limit have been seen by other observers.

Fowler (43), in discussing the roentgen findings in petrositis, came to the conclusion that partial pneumatization of the petrous pyramid is usually not apparent in roentgenograms that roentgen evidence of petrositis does not necessarily mean operative petrositis, and that the absence of evidence of petrositis in roentgenograms does not necessarily mean that the condition is not present.

Seydell (43) reviewed 46 cases of petrositis reported in the literature in 1934. Orbital pain was absent in 36 per cent and hemibranchial pain was absent in 5 per cent. Sepsis of low grade was present in only 70 per cent, and palsy of the abducens nerve in 41 per cent. Labyrinthine symptoms were observed in 2 per cent, and signs of meningeal irritation in 34 per cent. The mortality was 34 per cent.

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Youngs reported a case of chronic petrositis, with observations made at necropsy. In this case

there were 7 separate draining fistulas in the neck and head. At first glance actinomycosis was suspected, but bacteriologic examination revealed the presence of a pneumococcus. Pre operative roentgenograms taken after the injection of lipiodol showed that the sinuses led to the temporal bone. The illustrations of the temporal bone removed at necropsy are especially interesting.

Williams reported 2 cases of petrositis with signs of meningeal irritation in which operation performed by the technic of intracapsular exploration was followed by recovery. He stated that in cases of petrositis, even those with signs of meningeal irritation, the condition can usually be relieved if a search is made for tracts in the regions in which they are known to occur and any tracts found are followed to the apex. He said that he meant not fistulas, but definite preformed cell tracts, the presence of which is suggested by a reddened, somewhat granular condition of the bone instead of pus. As all cell tracts tend to communicate toward the apex, it is usually not necessary to resort to radical mastoidectomy. He reported a mortality of 11 per cent in 17 cases of petrositis in which operation was performed by intracapsular exploration.

In dissecting 100 temporal bones, Ziegelman found that the majority were of the mixed pneumatic and diploic type except for the petrosal tip, which was predominantly diploic. He concluded that from the standpoint of surgical anatomy these specimens indicated that the pathologic change is usually in relation to the posterior surface of the pyramid, but that the shortest route for drainage is in relation to the anterior aspect of the pyramid.

In 1935 Kopetzky and Almour reported in detail 10 cases of petrositis additional to those reported by them in 1930. They advised against drainage of the petrosa by the perilyabyrinthine route without the performance of a radical mastoidectomy because, of 3 patients so treated, 2 was subject to epilepsy after the operation, 1 developed postoperative manic depressive insanity, and 1 was left with an ugly scar. It is unfortunate that Kopetzky and Almour should have had such results in 3 cases since, according to the experience of other surgeons, their assumption that they were due to the fact that radical exposure was not done is unjustifiable. They reported 31 cases of petrositis in which operation was performed with 4 deaths, a mortality of approximately 13 per cent.

In the period from 1925 to 1935, Richter observed 14 cases of petrositis. Six of the patients recovered and 8 died. The recoveries demonstrate the vigorous qualities of his patients as recovery



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In the period from 1925 to 1935, Richter observed 14 cases of petrositis. Six of the patients recovered and 8 died. The recoveries demonstrate the vigorous qualities of his patients as recovery

was usually brought about by the spontaneous extracranial rupture of an extrapyramidal abscess after some months.

Lumsden reviewed 9 cases of Gradenigo's syndrome in which there were 4 deaths. The records are not sufficiently clear to substantiate a diagnosis of petrositis in any of them.

Reuling reported 2 cases of petrositis with spontaneous recovery and pointed out that the profuse drainage indicated the presence of a fistula which was draining the diseased area rather adequately.

Bulson reported 3 cases of petrositis in which simple mastoidectomy alone was done. One of the patients died.

Rozen and Kaplan advised a ventricular puncture on the side opposite the lesion in petrositis to facilitate elevation of the temporal lobe when a modified operation by the method of Eagleton is to be performed. They stated that the ventricular puncture markedly improves the facility with which the brain can be raised and has the additional value of giving a clue to the presence of a brain abscess if the ventricle is displaced or dilated. This procedure would be dangerous if organisms are present in the spinal fluid as under such conditions it might diffuse localized meningitis and produce encephalitis along the tract of puncture.

Kisch reviewed some of the recent literature on petrositis and reported on specimens taken at necropsy from a case in which meningitis developed following mastoidectomy. In this case there were no symptoms suggesting the presence of a lesion in the petrous apex.

Watkins Thomas expressed the opinion that infection by the diplococcus pneumoniae Type III with its virtual absence of symptoms, especially discharge, is the most dangerous form of petrositis. He emphasized that when an adequate complete mastoidectomy has been performed the appearance of symptoms of petrositis does not necessitate immediate surgical intervention and is not an indication for intervention on the petrous apex at any time unless the discharge ceases suddenly, the local symptoms increase or evidence of septicaemia or irritation in the dura develops. He reported a case in which operation was performed successfully by Eagleton's technique.

Pröfant (or) reviewed the literature on petrositis and agreed with Guild that the diagnosis of the condition should be based on a consideration of all symptoms present rather than any one syndrome. He devoted a considerable part of his discussion to the routes of infection along the lower part of the petrous pyramid and stressed

the importance of infection of the hypoglossic route. He described several anatomic specimens. In 6 of these the Kopetzky-Almouy triangle was very small and contracted rendering operation difficult. In specimens in which the jugular bulb was high there were no cells in the hypoglossic route. In reporting 8 cases observed clinically, Pröfant emphasized that in many cases a slight and moderate mastoiditis one should be on the alert for the presence of petrositis as this may seriously influence the course of the mastoiditis, but he stated that operation is not definitely indicated by this complication unless there are signs that free drainage from the apex is not taking place. He believes that Gradenigo's syndrome almost always depends on infection in the petrous apex, and that the disappearance of pain of the abducens nerve after mastoidectomy or myringotomy indicates that adequate drainage of the petrous apex has been established along the cell tracts present.

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# ABSTRACTS OF CURRENT LITERATURE

## SURGERY OF THE HEAD AND NECK

### HEAD

Lindblom, K. A Roentgenographic Study of the Vascular Channels of the Skull *Acta radiol.*, 1936, Supp 30

The roentgenograms of 450 patients of various ages who were examined for fresh head injury were studied with regard to demonstration of the vascular anatomy by the X rays. In 130 cases the important vascular channels with the exception of the optic, jugular, and condyloid foramina and the hypo glossal canal, were studied quite completely. Supplementary studies were made of 15 specimens of skulls with the attached cervical spine, 12 injection-dissection specimens, and the skulls of 22 persons coming to autopsy.

The vascular system of the brain and overlying structures consists of 3 separate systems namely a cerebral (and cerebellar) system, a meningeal osseous system, and a system for the superficial soft parts and bone. Each system consists of several arteries and veins with communications between the systems. Under normal conditions these communications seem to be relatively unimportant, but under pathological conditions they may explain some of the vascular changes demonstrated roentgenographically.

A comparison was made between the vascular channels of the skulls of normal persons and those of 536 patients with brain tumors or related conditions which were studied roentgenographically, and verified histologically. In the cases of glioma of the frontal parietal, temporal, or occipital lobes there were no signs of distinct value for localization. A decrease in the vascular markings or widening of the occipital emissary channel, considered a positive sign of increased intracranial pressure, was found in 2 per cent of the cases of glioma of the frontal lobe, 25 per cent of those of the occipital lobe, 4 per cent of those of the temporal lobe, 8 per cent of those in the region of the basal ganglia, 31 per cent of the cases of pineal tumor, 36 per cent of those of mid brain tumor, and 27 per cent of those of posterior fossa glioma. Unilateral widening of the foramen ovale in cases of temporal lobe tumor was considered as of suggestive value in localizing the tumor to the posterior part of the lobe.

In cases of meningioma of the anterior third of the superior sagittal sinus the meningeal osseous channels showed considerable change, chiefly local widening and markedly tortuous grooves leading to the tumor area were common. In the majority of the cases the foramen spinosum was widened.

Bone vascularity was increased in 66 per cent. Positive signs of localizing value were present in 83 per cent. Meningiomas of the middle third of the superior sagittal sinus gave positive roentgen evidence of their presence in 71 per cent of cases, but the signs were not so marked as in the cases of meningioma of the anterior third of the sinus. Widening of the occipital emissary vein was noted in 17 per cent of the cases of tumor of the anterior third and 5 per cent of those of tumor of the middle third of the sinus. Meningiomas of the posterior third of the superior sagittal sinus showed definite localizing changes in 50 per cent of the cases. An additional 37 per cent showed signs of either increased intracranial pressure or increased vascularity.

Meningiomas of the cerebral convexities produced definite diagnostic roentgen signs in 96 per cent of the cases. Increased bone vascularity and widened meningeal osseous channels on the side of the tumor were common findings. Of the cases of meningioma of the lesser wing of the sphenoid, vascular changes were noted in only 20 per cent whereas hyperostosis was present in 60 per cent. Cases of meningioma of the floor of the middle or posterior cranial fossa or in the suprasellar region showed no localizing roentgen changes. Those of meningioma in the region of the crista galli and olfactory groove showed no vascular changes, but in 8 of 13 cases local bone changes were noted.

Cases of hypophyseal duct tumor, pituitary adenoma, neurinoma, and tuberculoma showed no vascular signs of value for localization.

Of the cases of arteriovenous aneurisms, the meningeal osseous channels were widened in 25 per cent. Widening of the cerebral artery channels was present in 33 per cent, but could not be considered of localizing value.

DAVID CLEVELAND, M.D.

McKinney, J. McD., Acree, F., and Soltz, S. E. The Syndrom of the Unruptured Aneurism of the Intracranial Portion of the Internal Carotid Artery. *Bull. Neurol. Inst. New York*, 1936, 5: 247.

The authors cite twenty nine cases of unruptured aneurism of the intracranial portion of the internal carotid artery which they have collected from the literature and report in detail eight cases of their own. In all of the latter there was a partial or complete ptosis together with fixation of the pupil, complete or partial paralysis of the muscles supplied by the third nerve, complete or partial paralysis of the fourth nerve, and loss or reduction of the corneal

reflex on the side of the lesion. In six, the sixth nerve was partially or completely paralyzed. In five, there was a unilateral exophthalmos, in four, pallor of the disk. In six, reduction of visual acuity and in six, contraction of the visual field on the affected side.

The authors emphasize the importance of x-ray studies in the diagnosis of the condition. One of the most constant x-ray findings is unilateral erosion of the sella. Calcification in the wall of the aneurism and unilateral enlargement of the optic foramen and superior orbital fissure are common. Enlargement of the sella may occur. Erosion with haziness of the outline of the carotid canal is an occasional finding as is displacement of the pineal gland. The authors believe that a bruit is less apt to be heard over an unruptured aneurism than over an aneurism of the communicating type. The latter is practically always accompanied by a bruit. Pulsating exophthalmos does not occur in all cases of arteriovenous aneurism. In cases of aneurism of the unruptured type, pulsations of the veins of the retina are occasionally observed. Roentgen studies will be of considerable aid in the differentiation of unruptured aneurisms from cavernous sinus thrombosis, orbital cellulitis, orbital neoplasms, Gradenigo's syndrome, sphenoidal ridge meningiomas, intracranial choroidomas and pituitary adenomas. The symptoms referable to the second, third, fourth, fifth, and sixth cranial nerves on the affected side are what might be expected from consideration of the anatomical relationships of the intracranial portion of the internal carotid artery.

JOHN MARTIN, M.D.

**Desaive P. Tumors of the Salivary Glands (Les tumeurs des glandes salivaires)** *Ann. belge d. sc. méd.*, 1936 8: 170

Desaive presents an analysis of 20 cases of tumor of the salivary glands observed at the Centre Anti-Cancereux of Liege, Belgium, in the ten year period from 1925 to 1935. These cases represent approximately 0.4 per cent of all cases observed at that institution. The parotid gland was involved in 17 cases, the sublingual gland in 1 case and the submaxillary gland in 2 cases. The patients were 11 women and 9 men with an average age of 47 years. Only 4 of them were over 60 years of age. Involvement of the adjacent glands was found in only 2. Sixteen of the tumors were of a mixed type. Of these 9 were still benign. One tumor was a primary carcinoma of the parotid gland, 1, an adenocarcinoma of the submaxillary gland, and 1 a cylindroma of the sublingual gland. One tumor was not studied histologically.

One of the patients with a tumor of the parotid refused treatment and died of cancer 4 years after the onset. The 10 other patients were treated by various methods. Of these 4 with a malignant tumor of the parotid died after a relatively short time. The patient with an adenocarcinoma of the maxillary gland is still living but not cured. The 14 other patients are living and have been free from signs of

disease for periods varying from 1 month to 10 years. Two of these were treated at least 5 years ago, 4, from 16 months to 4 years ago, and the others less than a year ago.

In cases of mixed tumor without malignant degeneration the prognosis is good, but in those with evidences of malignancy the chances of cure are reduced. Of 7 patients treated for malignant mixed tumors, only 4 are "cured" and only 1 of these has been cured for more than 5 years. In primary cancer the prognosis is still less favorable. Ten of the 19 cases of such cancer reviewed by the author were treated by surgery supplemented by radiotherapy.

In reviewing the statistics of others in comparison with his own results, Desaive comes to the conclusion that in cases of small and mobile benign mixed tumors the tumor should be removed surgically and postoperative irradiation should be given to prevent recurrence. If the tumor is more extensive and fixed so that complete removal would involve sacrifice of the facial nerve, it should be treated by the insertion of radium ('curie-puncture') combined with irradiation of the surface with radium molds or the roentgen rays. When the lesion is malignant, the treatment should consist of irradiation alone (combined interstitial and surface irradiation). If the growth is operable it should be removed by as radical an operation as possible followed by irradiation, as a rule only surface irradiation. In cases of postoperative recurrence or gland involvement a combination of surgery and irradiation as for the primary tumor is indicated. If there are metastases, only palliative irradiation is possible. As benign salivary gland tumors of the mixed type are definitely precancerous, they should be treated as early as possible by operation plus postoperative irradiation. The author is of the opinion that probably not more than 10 per cent of definitely malignant growths can be definitely cured even by a combination of surgery and radiotherapy.

ALICE M. MEYERS

## EYE

**O'Brien C. S., and Braley A. F. Common Tumors of the Eyelids.** *J. Am. M. Ass.* 1936 107: 933

Tumors of the eyelids are quite common. Most of them arise from the skin and its appendages.

Of a series of 100 consecutive tumors of the eyelids which the authors studied clinically and with the microscope, 84 were benign and 16 malignant. The benign tumors included 34 papillomas, 17 nevi, 13 sebaceous cysts, 5 fibromas, 4 sudoriferous cysts, 4 hemangiomas, 2 dermoid cysts, 2 lesions of molluscum contagiosum, 1 sweat gland adenoma, 1 xanthelasma, and 1 granuloma. Of the malignant tumors 15 were carcinomas and 1 was a melanoma.

It is apparently sometimes difficult if not impossible, to make an accurate clinical diagnosis of a tumor of the eyelid. Papilloma, nevus and fibroma and, at times, early epithelioma are easily confused if they are at all atypical in appearance. Molluscum

may be difficult to differentiate especially if the nodule is located at the margin of the lid. A sebaceous cyst may be confused with fibroma or xanthelasma, and, in the early stages, before the occurrence of ulceration, carcinoma may be difficult to differentiate from papilloma, nevus, and fibroma.

LESLIE L. MCCOY, M.D.

**Brown, E. V. L.** Severe Tuberculosis of the Anterior Segment of the Eye. *Am J Ophth*, 1936, 19: 668.

The author reports in detail 4 cases of severe tuberculosis of the anterior segment of the eye. Unusual features in all were associated severe pulmonary tuberculosis and healing of the ocular tuberculosis under rest treatment alone. In 5 of the 6 eyes useful vision was maintained for a period of from 8 months to 6 years. In 1, vision was poor.

SAMUEL A. DURR, M.D.

**Leinfelder, P. J., and Kerr, H. D.** Roentgen-Ray Cataract. *Am J Ophth*, 1936, 19: 739.

In studies of roentgen ray cataract in rabbits the authors found that the opacity was most marked in the animals receiving the greatest dosage of irradiation in the shortest time. Corneal changes attributable to the roentgen rays were not observed. Hyperemia of the iris and iridocyclitis did not occur. The only external signs noted were a transient purulent conjunctivitis. The ordinary doses used in roentgen therapy produced non progressive cataracts. In equal dosage, the long rays caused more damage than the short rays. Microscopic examination revealed subcapsular swelling and degeneration of the lens fibers. The early changes were seen at the equator, but the injury later extended to the posterior polar region. The non progressive changes consisted of a posterior polar horizontal opacity with radiating rows of vacuoles. Anterior subcapsular and cortical changes indicated severe damage which resulted in total opacity.

The authors report also clinical observations made in the cases of 2 children and 3 adults for a period of from 20 to 38 months after roentgen therapy. The 2 children developed lenticular opacities following treatment for an adamantinoma and a fibrosarcoma respectively. The opacities developed in the nineteenth and twentieth months. In one eye, which received only small doses, the lens was unaffected. In the 3 adults the lenses were protected and no opacities developed.

EDWARD S. PLATT, M.D.

**Rados, A., and Rosenberg, L. C.** The Relation Between Blue Scleras and Hyperparathyroidism. *Arch Ophth*, 1936, 16: 8.

Attention was called to the association of blue scleras with fragilitas ossium by Elman in 1788, Lohstein in 1833, and von Ammon. In 1917, Bronson, and in 1918, Van der Hoeve and DeKleyn, independently introduced hereditary deafness as a part of the entity. Among the theories of the causation of the syndrome are included both over activity

and under activity of the parathyroid glands. The authors made a detailed study of 2 cases to determine the relationship between blue scleras and the parathyroids.

In fragilitas ossium there is a marked hereditary tendency which is sometimes traceable through several generations. Some of the affected persons show only 1 or 2, and others all 3 symptoms of the syndrome. Multiple fractures may occur *in utero* or in childhood. The condition shows a tendency to become arrested after puberty and then gradually to recede. The hereditary deafness is apt to begin after the age of twenty, but its development may be prevented by death due to intercurrent disease.

The blue color of the scleras varies in different cases, the degree of blueness being due to a changed transparency to light without a microscopically discernible anatomical change. Other conditions reported to be associated with the syndrome are prominence of the frontal and occipital bones, frequent luxations of the interphalangeal joints, kyphosis, lordosis, scoliosis, delay of dentition, brittleness of the teeth, syndactylism, mongoloid idiocy, vitium cordis, palatum fissum, conical cornea, and zonular cataract.

Pathological disturbance of the parathyroid glands may lead to hyper activity, with a negative calcium balance and generalized osteitis fibrosa cystica, or to hypo activity, with a positive calcium balance, tetany, and a characteristic hyperirritability which is manifested by the Chvostek and Trousseau signs. The amount of calcium present in the tissues is responsible for their neuromuscular irritability. The latter varies inversely with their calcium content. Hypotonia is associated with hyperparathyroidism, and hypertonia with tetany. Estimation of the calcium balance rather than of the calcium content of the blood is necessary to determine the status. An increase of the blood calcium above the normal of from 9 to 11 mgm per 100 c.c. with a simultaneous increase in the calcium excretion on a controlled intake is a negative calcium balance characteristic of hyperparathyroidism.

Numerous conditions may cause an increase in the calcium level of the blood (multiple myeloma and metastatic malignancies) or a decrease in the phosphorus level (rickets and osteomalacia), but the combination is pathognomonic of hyperactivity of the parathyroid glands. Auh and Bauer regard a calcium level above 11 mgm and a phosphorus level below 3.5 mgm as suspicious.

High values for blood phosphatase, an enzyme with a specific rôle in the deposition and maintenance of calcium and phosphorus compounds in the tissues, are found in diseases in which there is abnormal destruction or formation of bone tissue. However, only hyperparathyroidism shows a high phosphatase ranging from 12 to 25 Bodansky units (normal, from 2 to 4 units) combined with a negative calcium and negative phosphorus balance.

The distinguishing features of parathyroid hyperactivity, which may be caused by a tumor of the



glands, are a negative calcium balance and generalized osteitis fibrosa cystica. Other features are polydipsia, polyuria, malaise, constipation, anorexia, loss of weight, vague muscular and articular pains, tenderness of the bones, frequent fractures, decreased excitability of the nerves, muscular atony, skeletal shortening, kyphosis, osseous tumors, stones in the kidney and ureters, and anemia with leukopenia. The osseous changes consist of generalized decalcification, cyst formation and tumors. In some cases changes occur in the terminal joints of the fingers, the tips of the fingers are short and square and the nails are stubby and broad. These changes are not to be confused with the clubbing seen in pulmonary osteoarthropathy.

Critical analysis leads to the conclusion that parathyroid hyperactivity should be suspected only in the presence of a negative calcium and phosphorus balance, an increase in the phosphatase content of the blood and the characteristic x-ray changes of osteitis fibrosa cystica. The osteoporosis in other conditions, especially that associated with blue scleras, is an entirely different pathological entity which is not based on parathyroid disturbances.

The skeletal changes associated with blue scleras are described as osteogenesis imperfecta or osteopetrosis. The latter is considered essentially the same as the former and is called by Looser, osteogenesis imperfecta tarda. The condition is one of embryological defectiveness of the mesenchymal tissues, the more highly organized of which—bone cartilage and tooth pulp—are chiefly involved.

The authors discuss metabolic changes reported by others which show a lack of uniformity in the extent of laboratory investigation. Metabolic studies carried out at the Beth Israel Hospital, Newark, New Jersey, in 2 cases clearly demonstrated the decided differences in the pathological osseous condition existing in hyperparathyroidism and that associated with blue scleras. A critical analysis of the literature shows that in the cases of osteogenesis imperfecta and associated blue scleras the presence of an endocrine disturbance was assumed on the basis of vague clinical symptoms.

Among more than 200 cases of proved hyperparathyroidism there were only 4 in which blueness of the scleras was noted. An explanation of the simultaneous presence of these 2 conditions is still lacking. The most plausible explanation is the presence of a congenital syndrome of blue scleras with superimposed parathyroid tumor formation. In the usual cases of blue scleras associated with spontaneous fractures and hereditary deafness the variations in the calcium, phosphorus and phosphatase of the blood are not sufficient to warrant the assumption of endocrine disturbance. EDWARD S. PLATT, M.D.

Riddell, L. A. The Use of the Flicker Phenomenon in the Investigation of the Field of Vision. *Brit J Ophthalmol*, 1936, 20, 385.

Following the extensive use of the flicker phenomenon made by Granit in psychophysiological studies

of vision, Phillips attempted to employ the method for recording visual field defects in cases of intracranial tumor. This method is based on the fact that an intermittent light may appear to flicker or to be steady according to the rate of interruption. The number of flashes per second at which the light just appears to flicker is called the 'fusion frequency'.

The determination of the fusion frequency is difficult, requires a great deal of time, and is subject to variations which are not easy to interpret. Between 10 and 40 degrees from the center of the field it is more difficult than within the 10-degree limit, and beyond the 40-degree isopter reliable readings are not obtainable.

The various methods of investigation are described and their results are charted in detail.

Investigation of normal subjects shows that there is no constant value that flicker readings are essentially relative and that external factors must be rigidly controlled. In fifteen normal subjects there was considerable variation from one subject to another both in absolute values and in the degree of summation. The larger the area of flicker the higher the fusion frequency because of a process of retinal summation mediated by the horizontal synaptic paths in the retina. Summation is greater in the periphery. The variations are influenced by age, myopia, the time of year and pulmonary ventilation. Variations between quadrants in a given eye are not constant in distribution, varying slightly even from day to day. Otherwise there is a close correspondence between the values in the two eyes of the same person. In cases of held defect due to cerebral conditions no conclusions should be based on differences of less than three flashes per second.

A noteworthy feature of all the results in pathological cases was the tendency of the Granit-Harper law to be obeyed at all parts of the field even when the fields were defective, a test of the accuracy of the readings at any one point being thereby provided. This law is a mathematical expression of the fusion frequency based upon the area of flicker and two constants.

The work of Granit and his co-workers on the retinal action potentials and optic nerve potentials in flicker shows that flicker perception is distinct from steady light perception. The two may therefore be dissociated in disease of the retina but not in the pathways beyond. Hence there is little reason for expecting a dissociation in cases of cerebral tumor and of occipital injury such as was described by Phillips and by Riddoch.

In campimetry, vibration of a test object has the advantage of requiring no special apparatus or knowledge. In a good subject flicker can be measured more accurately but except for certain special aspects this appears to be its only advantage in lesions situated beyond the retina. In the author's studies it was quite exceptional for flicker to show a defect not found on the screen.

Of fifty-eight cases there was disagreement between the findings by the two methods in fourteen

In five the flicker fields were almost certainly wrong, while in nine, flicker may have been the more correct. In only two were the flicker findings substantiated by operation. In general, flicker results are much more difficult to interpret and will show no defect that cannot also be found by campimetry.

Flicker may be used to estimate the density of scotomas with fair accuracy, and may indicate also the degree of involvement of the fixation point in cases of lowered visual acuity. It will probably find its chief application in purely ocular conditions, but may be of use also in the study of certain purely neurological conditions. EDWARD S. PLATT, M.D.

## PHARYNX

Goodyear, H. M. The Etiology and Treatment of Hemorrhage of the Nose and Throat. Practical Considerations in Relation to Otolaryngology. *J. Am. M. Ass.*, 1936, 107, 337.

The author states that while ovarian extract is worthy of a trial in hemophilia, blood transfusion is the most reliable treatment.

In purpura hemorrhagica, blood transfusions have no value and splenectomy may offer the only relief. Hemorrhagic telangiectasia responds best to the chromic acid bead.

In hemorrhage from the anterior nasal septum, the use of 10 per cent cocaine followed by 50 per cent solution of silver nitrate is most satisfactory.

In bleeding from an injured sphenopalatine artery, gauze packing in the region of the anterior wall of the sphenoid is effective.

In intractable nasal hemorrhages the external carotid artery should be ligated.

The author believes that in adenoid operations insufficient attention is paid to adenoid bleeding. No adenoid operation should be considered complete without retraction of the soft palate and direct examination for bleeding points.

Since all branches supplying the tonsils are from the external carotid artery, this would be the vessel ultimately to be tied in an emergency.

In suppurative cellulitis following such illnesses as scarlet fever the erosion is in the internal jugular vein and not the carotid vessels.

Retropharyngeal abscess is relatively infrequent but always a potentially dangerous complication as is attested by the number of deaths reported. The pus should be aspirated before the incision is made.

Bleeding from a tonsillar infection with moderate intermittent attacks of bleeding and no definite pharyngomaxillary symptoms justifies removal of the tonsil and a search for the bleeding point.

When sudden severe expulsion of blood occurs in the presence of a retropharyngeal or peritonsillar swelling either before or after incision, no time should be lost in ligating the common carotid artery on the same side since at any moment the hemorrhage may recur with fatal results.

When the pharyngomaxillary space is distended with pus it can be drained by an incision anterior to

the anterior tonsillar pillar or posterior to the posterior tonsillar pillar.

Radical removal of the tonsil is justified after the incision of a peritonsillar abscess if little or no pus is found and the general distress and neck complications increase. Drainage of a hidden pocket may be thus established.

After ligation of the common carotid artery back circulation may occur through the external carotid. When an incision is made for ligation, the internal carotid usually comes into view before the external carotid is located. Bifurcation often occurs high, sometimes at about the angle of the jaw.

JAMES C. BRASWELL, M.D.

## NECK

Ducuing, J., Fabre, P., and Gouzy, J. Anatomico-clinical Bases for Dissection of the Neck for Cancer—Cancer of the Tongue in Particular (Bases anatomiques cliniques de l'evénement du cou pour cancer—cancer de la langue en particulier). *Ann. d'ana. path.*, 1936, 13, 397.

Theories regarding lymphatic involvement secondary to malignant neoplasms appear to be in a state of evolution and the discussion between surgeons and radiotherapists is far from ended.

At the present time surgical treatment is the best therapy of cancerous adenopathy if wide removal, *en bloc*, of all of the lesions is possible, but in malignant adenopathies in which complete removal of the lesions would be difficult radiotherapy is certainly preferable. In the future it may become possible, by improved irradiation technique, to treat all cancerous adenopathies by roentgen therapy, but at the present time it is wise to admit that the use of radiotherapy is based upon the contra-indications to surgery. It appears logical to the authors to treat by surgery all cancerous adenopathies in which the involved glands are mobile and anatomically removable *en bloc* and by radiotherapy those in which the glands are fixed or unapproachable surgically.

The authors discuss the surgical anatomy of the cervical lymph glands with special reference to the surgery of cancer, calling attention to the particular lymph nodes most likely to be involved by carcinoma primary in different parts of the head. They believe that the indications for total dissection of the neck are not so frequent as might be supposed. In cases of cancer of the pharynx and tonsil, which generally involves the inaccessible retropharyngeal glands, such dissection is usually contra-indicated, whereas in cases of primary lesions of the face, cheek, lips, anterior part of the tongue, and the floor of the mouth it is indicated. Endobuccal cancers should be treated with radium irradiation before extirpation of the glands is attempted unless the glandular involvement is extensive, in which case the dissection should be done first and the initial lesion treated very soon after the operation.

ROBERT H. IVY, M.D.

Schnitker M. T., Van Raalte, L. H., and Cutler E. C. The Effect of Total Thyroidectomy in Man. Laboratory Studies and Observations of Clinical Effects in Thirty Nine Cases. *Arch Int Med* 1936 57 857

Because of interest created by the large number of studies recently reported in the literature relative to total thyroidectomy for the relief of cardiac disease, the authors made a thorough and painstaking study of athyroidism particularly with regard to the physiological results of such surgery. Some of their findings have a practical clinical application and some a relationship to the present day widespread study of the endocrines but many are purely physiological data recorded for whatever scientific value they may have.

The material consisted of twenty two cases of angina pectoris fifteen of chronic valvular heart failure (including 1 of chronic myocarditis with failure) and two of diabetes mellitus and gangrene of a lower extremity in which total ablation of the thyroid was performed. The patients were followed up postoperatively sufficiently well to make the data of value. Observations were made on the basal metabolic rate, the volume of blood flow, the skin temperature, the mental reactions, the changes in body weight and the cholesterol, calcium, phosphorus, protein, potassium, iodine and sugar content of the blood. These determinations were made (1) just prior to the operation (2) within one week after the operation (3) when myxedema was setting in, (4) during myxedema and (5) after the institution of thyroid therapy.

In the cases of angina the basal metabolic rate declined to an average of  $-22.8$  per cent and in the cases of cardiac failure to an average of  $-27$  per cent in about ten weeks. The daily administration of 0.075 gm. of thyroid substance raised the level toward normal in from three to four weeks.

In the state of myxedema the blood cholesterol rose to an average of 404 mgm. per 100 c. cm. in the cases of angina and to an average of 315 mgm. per 100 c. cm. in the cases of cardiac failure. In both groups these values fell under thyroid therapy.

The authors found an inverse ratio between the fall of the basal metabolic rate and the increase in blood cholesterol following total thyroidectomy, and

believe that the level of the blood cholesterol may be a better index of thyroid function than the basal metabolic rate.

Eventually none of the patients with angina showed a decrease in vital capacity although 50 per cent of them showed such a decrease early. Of the patients with cardiac failure, 60 per cent showed an average increase of 24 per cent in vital capacity.

Both groups showed a slowing of the volume of blood flow but this was restored to normal by thyroid therapy.

Increased mental function was noted in the cases of induced myxedema.

With the decrease in vasomotor tone just after the thyroidectomy there was an average increase of 1 degree C in the skin temperature in both groups.

The patients in both groups gained from 6.6 to 7.8 lbs. in weight.

The calcium and phosphorus content of the blood remained normal.

In the cases of induced myxedema the total blood protein was lowered to the low normal and this value was not altered by thyroid therapy.

The iodine content of the blood fluctuated widely.

The two diabetic patients were distinctly benefited by the total thyroidectomy. It appeared that the operation had a distinct influence on patients with a deranged sugar tolerance, tending to increase tolerance but no appreciable effect on the sugar metabolism of patients without diabetes.

JOHN MARTIN, M.D.

Tucker G. Inflammatory Tumors of the True Vocal Cords. Direct Laryngoscopic Observations. *J Laryngol & Otol* 1936 51 363

Chronic inflammatory tumors of the vocal cords tend to increase in size because of the functional activities of the cords. A vicious circle—local irritation increases in the size of the tumor, and over action of the musculature of the larynx is set up.

In most cases the vicious cycle may be broken and the larynx restored to normal by direct laryngoscopic removal of the tumors and voice training to restore the normal muscular action. The diagnosis may be made by microscopic examination of tissue removed by direct laryngoscopy.

SARLET KAHN, M.D.

# SURGERY OF THE NERVOUS SYSTEM

## BRAIN AND ITS COVERINGS, CRANIAL NERVES

Kuntzen, Heinrich, and Fluegel Serial Studies Following Concussion of the Brain (Seriennuntersuchungen nach Gehirnschuetterungen) 60 Tag d deutsch Ges f Chir, Berlin, 1936

The judgment of head injuries is still a field disputed by surgeons and neurologists. The examination made immediately after the injury falls on the surgeon. The neurologist usually sees the patient first after about a half year has elapsed when the matter of compensation comes up. The discrepancy between the negative objective findings and the complaints of the patient leads to widely different opinions. At one extreme all of the complaints are regarded as due to a compensation neurosis. At the other, the presence of an as yet unrecognized organic change in the brain to which such terms as "encephalosis" and "encephalopathy" have been applied is assumed. To eliminate this uncertainty all cases of recent head injuries admitted to the surgical clinic at Leipzig are studied and followed up by both the surgeon and the neurologist from the day of the injury.

The authors discuss 50 cases which had been followed up for more than 2 years. In none of them were there symptoms of brain concussion, and in none was the patient involved in a compensation suit.

At the initial examination mild neurological symptoms (so called microsymptoms) were present in 70 per cent. These consisted of loss or weakening of the reflexes or a difference in the reflexes of the 2 sides, slight spastic disturbances of the reflexes varying from the Rossolimo to the Babinski type, and minor increases of tone. Absence or weakness of the individual abdominal reflexes was surprisingly frequent. In 50 per cent of the cases the blood sugar values were increased at first. As a rule all of these changes disappeared after a few days or weeks, but they were very regular during the first days. The presence of microsymptoms is not equivalent to severe concussion of the brain. Among the cases of severe brain concussion there was a series without microsymptoms, and among the milder cases there were many with such symptoms. It seems that these symptoms are more apt to appear in young persons than in older persons.

In the follow up investigation it was found that, on resuming their work, the patients complained of recurrence of their symptoms for a time. A fifth of them still complained after 2 years. Compensation neuroses and hysteria could be excluded. The patients with late symptoms were not always those whose condition at first suggested severe brain concussion. In the cases with no microsymptoms and no

evidence of severe concussion of the brain the treatment consisted of only rest in bed for a brief period, and there was no recurrence of the symptoms.

In conclusion the authors state that systematic neurological and surgical study of cases of head injury not only reveals the objective symptoms of brain concussion more clearly, but also permits greater certainty in the judgment of the sequelae of the injury.

In the discussion of this report, WANKE said that in order to obtain a definite conception of the vasomotor disturbances left by brain and skull injuries, which must be considered the basis of the subjective suffering and are sometimes the only symptoms, he and Pfeleiderer adopted a new method of study. Determinations of the skin temperature were made at symmetrical points on the body all the way from the forehead to the toes. It was found that after head injuries there was at times a considerable difference between the skin temperatures of the opposite sides of the body. The most striking findings were that the difference in the skin temperature was most pronounced at the periphery and that the temperature of the skin may be increased over one whole side of the body. In some cases the temperature differences varied, the increase occurring sometimes on the right side and sometimes on the left. Wanke showed the findings by means of 4 graphs. (KUNTZEN, HEINRICH and FLUEGEL)

JOHN W. BRENNAN, M.D.

Coates, G. M., Shuster, B. H., and Slotkin, H. B. Vestibular (Barány) Tests in the Diagnosis and Localization of Intracranial Lesions. A Report of Sixteen Proved Cases. J. Am. M. Ass., 1936, 107: 412.

The authors report a series of 16 cases in which a clinical diagnosis of intracranial lesion was made and was subsequently proved at operation or autopsy. Vestibular tests were made in all, for the purpose of determining the value of these tests irrespective of the data obtained by other methods of examination. Attention is called to the fact that the classical cardinal symptoms of increased intracranial pressure are often absent in such cases. Even papilledema is absent in from 15 to 30 per cent of cases of brain tumor.

Vestibular tests are of value because they may serve to confirm the data obtained by other studies, they may supply information which explains other wise apparently conflicting observations, they may occasionally yield the only conclusive evidence of the presence of an intracranial lesion, and in some cases, such as those of lesions involving the cerebellopontine angle, they may make diagnosis possible before the appearance of general clinical phenomena, at a time when operation promises the best results.

The authors present a brief clinical summary of their 16 cases and discuss the value of the vestibular tests in each of them

ARTHUR S W TOUROFF MD

Gardner W J Cerebral Angiomas and Aneurisms *Surg Clin North Am* 1936, 16 1019

The author reports 6 cases of anomalies of the cerebral vessels which were treated successfully by surgery

In the first case there was an arterial angioma of the cortex of the right frontal lobe. The only noteworthy sign was generalized convulsions. The angioma was treated by ligation and cauterization with the electrocautery. As nervous tissue was found between the vascular loops it was classified as an angiomatous malformation not an angioblastoma.

In the second case suboccipital craniotomy revealed a cystic cavity in the left cerebellar hemisphere. On the wall of the cavity there was a small red velvety nubbins of tumor tissue. The histopathological diagnosis was cystic hemangioma.

In the third case a solid hemangioblastoma grossly resembling a meningioma was removed from the right motor area.

In the fourth case that of a woman 48 years old a diagnosis of pituitary tumor extending into the right middle fossa and causing paralysis of the first 6 cranial nerves and secondary trigeminal neuralgia was made but craniotomy revealed an aneurism of the internal carotid artery the size of a goose egg. To control the bleeding the cavity of the aneurism was packed with 5 gauze sponges. The sponges were left in place for 2 years and were removed eventually to close a constantly draining sinus. The patient made a satisfactory recovery.

In the fifth case a spontaneous and persistent subarachnoid hemorrhage resulted from the rupture of an aneurism of the circle of Willis. A muscle stamp was placed over the bleeding point. No ligation was used. A mechanical explanation of the frequency of aneurisms in this location is offered by the lack of surrounding tissue to support the vessels the thinness of the vascular walls and the sharp angulation in the course of the vessels.

In the sixth case operation disclosed a subcortical cavity in the temporal lobe which contained old blood apparently due to a massive spontaneous intracerebral hemorrhage. Evacuation of the cavity was followed by recovery. JOHN MARTIN MD

Davison C Brock S and Dyke C G Retinal and Central Nervous Hemangioblastomatosis with Visceral Changes (Von Hippel Lindau's Disease) *Bull Neurol Inst New York*, 1936 5 72

The authors report in detail the case of a man with hemangioblastomatosis of the retina and central nervous system with widespread visceral involvement. Only 4 other cases of hemangioblastomatosis of the spinal cord associated with syringomyelic cavities have been recorded. In a period of

7 years beginning at the age of 14 years the author's patient became blind, first in one eye and then in the other. In the 23 years following the onset many symptoms referable to the gastro-intestinal, circulatory, and central nervous systems made their appearance. Death was due to involvement of the medulla oblongata. Roentgenograms showed an imperfect ring of calcium in each eye. The autopsy findings are reported in detail.

ROBERT ZOLLINGER MD

Nelson A A Metastases of Intracranial Tumors *Am J Cancer* 1936, 28 1

Nelson reports in detail a case of cerebellar tumor which was operated upon twice. The first histologic report was medulloblastoma the second glioma. The specimen studied at autopsy was believed to show definite signs of medulloblastoma. Section of the four lower thoracic vertebrae disclosed discrete tumor masses the histologic appearance of which was like that of the tumor masses in the brain and the spinal cord.

The author suggests that if a search for extradural metastases were made more frequently in cases of intracranial tumor it might be found that such metastases are not so rare as they are believed to be.

JOHN MARTIN MD

Geraghty W R Extensive Bilateral Subdural Abscess A Microscopic Study of the Meninges and Brain Report of a Case *Ann Otol Rhinol & Otolaryngol* 1936 45 452

The author reports in detail the case of a 49 year old man with an extensive bilateral subdural abscess arising from a suppurative left frontal sinusitis. The case is reported primarily to demonstrate the combative and protective powers of the leptomeninges against infection. Postmortem examination revealed a localized meningitis involving a large part of the cortex of both central hemispheres with encystment of approximately 250 c cm of pus between the dura and the piaarachnoid. Immediately beneath the subdural abscess there was edema with hemorrhage and necrosis of the brain. Cerebrospinal fluid obtained by lumbar puncture 8 days before death showed a cell count of 700 and no organisms indicating that the general subarachnoid space presents evidence of an inflammatory reaction before this space becomes invaded by micro organisms.

ROBERT ZOLLINGER MD

Smith F Basal Meningitis Some Considerations and a Proposed Management *J Am M Ass* 1936 107 189

The author describes 2 methods of surgical treatment of basal meningitis and reports 3 cases in detail. He states that the floor of the involved area under consideration is the roof of the posterior ethmoidal cells the sphenoid sinuses and the basilar process of the sphenoid bone. He discusses the possible modes of extension of infection through this region to the adjacent arachnoid space.

The time between the initial infection and the extension of the infection beyond the circumscribed area involved at first varies from 1 to 40 days, depending upon the virulence of the invading organism. The clinical picture of basal meningitis is typical. Frequently the onset is characterized by a feeling of malaise, a dull heavy sensation behind the eyes, or an orbital neuralgia. Pain may be present in the supra orbital, malar, and mandibular regions. With advance of the disease the patient lies on his back with his eyes closed, in a state of semi coma from which he is easily aroused. There is no stiffness of the neck until the cisterna magna becomes involved. Repeated examination reveals intermittent, recurrent vertical nystagmus and occasionally similar behavior in the horizontal plane. Paresis or paralysis of the sixth nerve may occur. The temperature is slightly raised and there is a moderate leucocytosis. The spinal fluid is under slightly increased pressure. It shows an increased cell count, but may still be sterile in the initial stages. At this stage of the disease treatment establishing free drainage and restoring the normal circulation may save life. The requirements are drainage of the basilar process of the sphenoid, with or without drainage of the basilar cistern, depending upon the extent of the disease.

The author's 2 methods of approach for drainage of the pontine cistern are shown by drawings. One is an intranasal trans sphenoidal approach and the other a transoral approach. The operations are described in detail. Serious consequences may occur as the result of ischemia of vital centers. The fluid should be withdrawn slowly until the drainage is complete. This results in relief of the local congestion, greater collapse of the space and more complete walling off of the infected area.

ROBERT ZOLLNER, M D

Grant, F C. Alcohol Injection in the Treatment of Major Trigeminal Neuralgia. *J Am M Ass*, 1936, 107, 771.

Grant's arguments in favor of the alcohol injection treatment of trigeminal neuralgia are based on a series of 331 injections of various branches of the fifth cranial nerve. Two hundred and fifty of the injections were given to 185 patients suffering from major trigeminal neuralgia, and 81 to 69 patients suffering from painful malignancies in the area of sensory supply from the trigeminal nerve. Instructions for injection, based on the Levy-Baudouin extra oral subzygomatic technique are presented, and the anatomical approach to each of the 3 branches of the nerve is shown by 2 illustrations.

Grant is enthusiastic over alcohol injection of the trigeminal nerve. He stresses particularly its aid in diagnosis and points out its value in the cases of patients who will not consent to surgery or who are poor surgical risks. He has found that if patients so treated come to operation eventually they are more satisfied with the results because they are accustomed to anesthesia of the face.

JOHN MARTIN, M D

## SPINAL CORD AND ITS COVERINGS

Craig, W Mck. Tumors of the Spinal Cord and Their Relation to Medicine and Surgery. *J Am M Ass*, 1936, 107, 184.

The symptoms of tumors of the spinal cord are extremely interesting. While they may conform to a definite pattern, their protean manifestations make them an important factor in general diagnosis. Intraspinal tumors may masquerade for many years as syphilis, pernicious anemia, multiple sclerosis, syringomyelia, sciatica, arthritis, myositis, or neuritis. They may produce pain that is referred to the abdomen, pelvis, and extremities. They may simulate appendicitis, cholecystitis, twisting of the pedicle of an ovarian cyst, and fibromas, and they may produce scoliosis, spasticity, and paralysis.

Of more than 300 cases in which the diagnosis of tumor of the spinal cord was proved at the Mayo Clinic, pain was present in approximately 80 per cent. The average duration of this symptom was considerably longer than two years.

The second stage in the development of the symptoms of tumors of the spinal cord is characterized by changes in motion and sensation. Numbness or peculiar sensory feelings may call the patient's attention to the sensory changes. These may be the initial symptoms or may follow the pain. Sensory changes usually develop simultaneously with the motor changes. The classical Brown-Sequard syndrome may be present. This consists of diminution of power on one side of the body and sensory changes on the other. As the compression of the spinal cord persists and increases, the third or final stage develops. This is characterized by complete paralysis.

In reviewing the records of patients who were relieved of disabling symptoms by the surgical removal of tumors of the spinal cord at the Mayo Clinic it was extremely interesting to note the many problems that involved general medicine and surgery and continually presented themselves during the development of the symptoms and before a correct diagnosis could be made.

One of the most important considerations is the fact that the lesion may be associated with a constitutional disorder. For this reason a complete examination should be made. Roentgenograms have been of value in localizing tumors of the spinal cord in about 60 per cent of the cases. A complete neurological examination is necessary, for some small and apparently insignificant change in motor, sensory, or reflex power may be of extreme importance in the differential diagnosis. Examination of the cerebrospinal fluid is imperative, for not only are the physical characteristics important but the chemical and serological changes may be the one clue to the correct diagnosis.

Examination of the cerebrospinal fluid is especially important whenever there is a question of syphilis, as is so frequently the case.

Pernicious anemia is seldom confused with tumor of the spinal cord. However, Woltman found that in

approximately 12.7 per cent of the cases of pernicious anemia seen at the Mayo Clinic the patient sought treatment for the relief of symptoms which were directly attributable to involvement of the nervous system.

Tuberculosis of the central nervous system is usually preceded by a demonstrable focus in some other part of the body. If it involves the spinal cord there are usually associated bony changes which are demonstrable in the roentgenograms. If the tuberculous lesions are within the meninges or involve the nervous tissue the prognosis is very unfavorable. However, tuberculomas of the spinal cord may be present without any evident focus elsewhere in the body. They may be removed surgically with relief of symptoms if they are extradural and the dura remains intact during the removal.

The rapid development of symptoms of tumors of the spinal cord always raises the question of malignancy and surprisingly enough both primary and secondary malignant tumors of the spinal cord occur so infrequently that even in the presence of malignant changes elsewhere in the body surgical exposure of the tumor to permit a differential diagnosis is justified.

Among the more common general conditions with which tumors of the spinal cord may be confused is arthritis. In many cases in which a tumor of the spinal cord is suspected the only lesions demonstrated by roentgenograms of the spinal column are hypertrophic changes in the vertebrae. Sometimes sciatica and pain in the lower part of the back are the only symptoms for a long time and the diagnosis requires very careful study. According to Hensch a tumor of the spinal cord should be suspected in any case of arthritis in which morphine or codeine is required to relieve the pain.

The painful syndrome of tumor of the spinal cord should be of extreme interest to the general surgeon because it is in this phase of development of such neoplasms that the patients usually insist on having something done to relieve the pain. Pain extending to the upper or lower right quadrant of the abdomen may be attributed to the gall bladder and pain extending to the pelvis to an ovarian cyst or a fibroid but after the suspected lesion is removed the pain persists.

Tumors of the spinal cord may simulate other neurological lesions or the neurological manifesta-

tions of constitutional diseases or infection. The painful syndrome which is present in 80 per cent of the cases may persist for months or years and may simulate that of diseases of the pericardium and pleura, the hilum, urinary and gastro-intestinal tracts and the peripheral nerves muscles and bones. The majority of tumors of the spinal cord are benign and operable. If such tumors are removed before they produce irreparable damage to the spinal cord restoration of function almost always follows. The mortality of operation for the removal of a tumor of the spinal cord is less than 4 per cent.

#### PERIPHERAL NERVES

Parker H. L. Peripheral Nerve Injury Due to Pressure. *Ann. J. S. S.* 1936, 126: 172.

The author reports several cases of peripheral nerve injury due to pressure. The first case was that of a 23 year-old farm girl who had been doing heavy manual labor and complained of weakness of the left hand. Palpation over the neck of the radius disclosed a thickened nodular cord which was assumed to be the dorsal interosseous nerve and a diagnosis of paralysis of that nerve was made. This disorder may occur in persons doing heavy manual labor or result from frequent injuries to the nerve particularly when the underlying supinator brevis is in a state of contraction.

Another case reported by Parker was that of a physician 45 years old who complained of numbness and a prickling sensation over the lateral aspect of the right thigh. Palpation over an area just below the antero-superior iliac spine disclosed a round nodular cord that could be rolled under the finger tips. Forceful compression produced a tingling over the lateral surface of the thigh. The cord was assumed to be the lateral cutaneous nerve of the thigh which had become thickened nodular and tender as the result of continued compression.

The author states that patients confined to bed over a long period of time should have pillows under the knees to prevent palsy of the common peroneal nerve from pressure on the bed of the over-extended lax knee joint. Continuous pressure on the elbows during convalescence may result in ulnar paralysis which the patient may attribute to carelessness during operation.

ROBERT ZOLLINGER, M.D.

# SURGERY OF THE THORAX

## TRACHEA, LUNGS, AND PLEURA

Kirklín, B. R. Congenital Cysts of the Lung from the Roentgenological Viewpoint *Am J Roentgenol*, 1936, 36 19

Up to 1925, congenital cysts of the lung were considered extremely rare and hence of minor importance in the differential diagnosis of pulmonary lesions. In 1934, Wood reported 16 cases observed at the Mayo Clinic and found records of 23 in the American and English literature.

The morbid anatomy of the affection was epitomized clearly by Koontz, who recognized 2 general types of cavities, namely, bronchial dilatations, with persisting muscle fibers and cartilage in the walls, and "cavities resembling emphysematous blebs lying subpleurally." Between these extremes are all sorts of gradations and transitions.

The clinical manifestations as described by many observers include attacks of dyspnea, cyanosis, cough, cardiac palpitation and, though rarely, hemoptysis, which vary in their combinations and degree of severity. Wood has pointed out that the symptoms and signs vary according to the extent and site of the lesions and the presence or absence of increased intrathoracic pressure. In many cases in which the cysts were small or only moderately extensive there were practically no symptoms and the lesions were discovered accidentally. However, Wood has suggested that the possible presence of cysts should always be considered in the cases of infants who have recurring attacks of severe dyspnea with cyanosis, and also in those of adults who have progressive dyspnea without other known cause. However, a confident diagnosis of the condition from symptoms and physical signs alone is seldom, if ever, possible, and roentgen examination is essential not only for identification of the lesions, but often also for their discovery.

Postero-anterior stereoscopic roentgenograms of good quality are usually adequate for revelation of the cysts. Occasionally lateral views are desirable to determine their exact relations. When a cyst is in contact with the thoracic wall, pneumothorax as induced by Wilson may make it possible to distinguish the wall of the cyst. Roentgenography after the intratracheal injection of iodized oil is often advantageous in determining whether cysts are open or closed and in depicting them more distinctly.

It is evident that the roentgen manifestations of congenital pulmonary cysts and the facility with which these cysts can be diagnosed vary according to the content, size, number, and situation of the cysts and the presence or absence of complications or concurrent disease.

Cysts completely filled with fluid and without an inflammatory zone about them cast round or ovoid,

uniformly dense, sharply circumscribed shadows which are easy to discern but not definitely distinguishable from those of many other pulmonary lesions.

Cysts containing both air and fluid in varying proportions are demonstrated so strikingly that they are not likely to be overlooked. The dense shadow of fluid with its level upper surface surmounted by a transradial hemispherical bubble of air is pathognomonic of a cavity containing these elements, but abscess, tuberculous cavitation, and draining hydatid cysts must be considered in the differential diagnosis.

Large cysts containing only air, which are most often single or do not exceed 2 or 3 in number, can usually be identified with a high degree of confidence. The brilliantly transradial area is devoid of normal pulmonary markings, and the portion of the wall of the cyst which is in contact with the unaffected part of the lung appears as a regularly curved line.

Multiple, grouped, air-filled cysts are not uncommon. In typical instances the affected region is abnormally clear, normal pulmonary and vascular markings are effaced, and the walls of the cyst appear as delicate, complete or incomplete rings or as a complex network of shadows resembling cobwebs. Multiple, relatively small, air-filled cysts tightly packed together are often polyhedral and in appearance resemble a honeycomb.

Multiple air-filled cysts must often be differentiated from emphysema, diaphragmatic hernia, and bronchiectasis.

Hernia of the stomach and bowel through the diaphragm may suggest pulmonary cysts, and vice versa.

Most perplexing among simulants of congenital pulmonary cysts, whatever the content of the latter, is acquired bronchiectasis, especially when the dilatations or cysts are multiple, small, and grouped.

All the foregoing considerations of diagnosis and differentiation apply particularly to cysts without complications or association with other disease. When the cysts are complicated by pneumothorax from the rupture of a cyst, or by hydrothorax, empyema, pneumonia, tuberculosis, or any of the various diseases that may attack the lung, exact diagnosis is almost impossible. Statistics indicate that not more than 5 per cent of cysts are associated with tuberculosis, and that although the complications and associated diseases that may occur are numerous they are more often absent than present.

In a large percentage of cases the roentgenologist can identify congenital cysts, especially those which are large and contain air, and in most of the others he should contribute data which will lead to the diagnosis when they are correlated with the clinical findings. That his cooperation with the clinician is



requisite in all cases scarcely needs to be stated. While up to 10 years ago the roentgenologist undoubtedly failed to recognize many congenital cysts now that he has become so keenly conscious of them he must resist the unavoidable tendency to mistake other lesions for such cysts.

**Maurer and Dreyfus Le Foyer.** Ablation of the First Rib and Anterior Thoracoplasty (Ablation de la première côte et temps antérieurs de thoracoplastie) *J de chir* 1936 48 1

As total removal of the first rib is sometimes necessary in the treatment of pulmonary tuberculosis the authors have devised a subclavicular and supraclavicular approach for this procedure. The ablation may be done subperiosteally or extraperiosteally.

In subperiosteal ablation by the subclavicular approach an incision is made just beneath the clavicle at about the junction of the middle and inner thirds and extended over to the sternum and down to the second cartilage. The first rib is then exposed by separating the fibers of the pectoralis major muscle. The costoclavicular ligament is separated and an incision is made through the periosteum. The periosteum is stripped off the first rib, the clavicle being used as a protecting structure to prevent injury to the subclavian vessels. The rib is first separated at its chondrosternal junction and then as far back as possible generally as far as or just beyond the attachment of the anterior scalenus muscle.

The supraclavicular approach is designed for the removal of the posterior arch of the first rib together with the transverse process of the vertebra. A vertical incision is made in the posterior triangle of the neck, the anterior fibers of the trapezius being pushed backward. The fibers of the middle scalenus muscles are then identified and great care is taken to avoid injuring the spinal nerve and the brachial plexus. The fibers of the middle and posterior scalenus muscles are separated from the superior border of the rib and the rib is exposed posteriorly until the transverse process of the vertebra comes into view. The transverse costal ligament between the transverse process and the first rib is sectioned and the rib disarticulated. The transverse process is then removed with a costotome. Both wounds are closed without drainage.

In the extraperiosteal ablation the approach is the same as for the subperiosteal ablation. The danger of injuring the structures immediately above the rib and the mediastinum at the sternal side are discussed and measures to eliminate this danger are described. The extra periosteal ablation of the first rib gives a very good collapse of the pleural dome and permits apicolysis with ease if this is desired. By using the incision employed for the subclavicular ablation of the anterior portion of the first rib the authors have removed also the anterior portion of the second rib. They state that if removal of the third rib is necessary it is best done toward the axilla. They list several contra indications to the removal

of too many ribs anteriorly. They describe the technique of axillary thoracoplasty in cases in which it is desired to remove the anterior portion of the second to the eighth ribs but do not give the exact indications for this procedure.

Thirteen hundred and forty two thoracoplasty operations have been done on 518 patients. The vast majority of these operations were paravertebral. In 45 only the first rib was removed. One hundred and eleven of the operations were parasternal thoracoplasties. An axillary thoracoplasty was done in 134 cases. The mortality was low. Only 3 per cent of the patients died within three months after the operation.

The article includes drawings and photographs showing the procedures described.

NATHAN A. WOMACK, M.D.

**Seelig M. G. and Benignus E. L.** Coal Smoke Soot and Tumors of the Lung in Mice. *Am J Cancer* 1936 28 90

The incidence of pulmonary cancer is greater in cities than in rural districts. Among the factors which may be responsible for this fact is the imbalance of smoke and soot in comparatively high concentration by the inhabitants of cities. To prove this theory the authors exposed white mice to coal smoke soot for various periods of time. Soot obtained by sweeping the flue of a furnace burning bituminous coal was used instead of sawdust and shavings as a bedding material for the mice. As the mice scampered about they raised the dust. One hundred mice were thus exposed. Fifty other mice were used as controls. All of the animals were approximately 3 months old and of an old, pure, tumor resistant strain. The experiment was begun in 1934 and was ended in 1936, by which time all of the mice had died.

The first mouse died after 2 days. The animal that died subsequently up to the end of 3 months had increasingly large amounts of soot in their lungs and bronchi. In those dying after 3 months the amount of soot found at postmortem examination was not greatly increased. Hyperplasia of the bronchial mucosa was found in 27 of the 100 exposed animals but in only 2 of the 50 controls. At the end of 6 months 20 per cent of the experimental group and of the control group had died. At the end of a year approximately 50 per cent of each group had died. At the end of 18 months all of the mice were dead. The mortality in the experimental group was not much higher than that in the control group. Serial section study revealed adenocarcinoma of the lung in only 1 (2 per cent) of the control animals but in 8 (8 per cent) of the experimental animals. In no instance were distant metastases present, but as the lesions were invasive, destructive and non encapsulated they were classed as true malignant tumors.

On the basis of the carcinogenic action of tar and of the invasiveness of soot into all of the structures of the lung, the authors conclude that the greater

incidence of primary pulmonary cancer in cities as compared with rural districts is not totally unrelated to smoke and soot

ARTHUR S W TOUROFF, M D

Wu, T T Generalized Lymphatic Carcinosis (Lymphangitis Carcinomatosa) of the Lungs  
*J Path & Bacteriol*, 1936, 43 61

Generalized cancerous permeation of the pulmonary lymphatics, called in the Continental literature "lymphangitis carcinomatosa," is a relatively rare condition. It is usually secondary to carcinoma of the stomach, occasionally to bronchial cancer, and rarely to cancer of other organs.

The author reports five cases and reviews forty-nine collected from the literature. Thirty two of the patients whose cases were collected from the literature were males. In about 75 per cent of the cases the primary tumor was in the stomach. Less common sites of the primary tumor were a bronchus, a breast, and the prostate. Rare sites were the uterus, sigmoid, gall bladder, ovary, and tongue. The frequency of gastric cancer as the primary lesion does not mean that this cancer is biologically more prone than other cancers to give rise to involvement of the pulmonary lymphatics. It may well be explained by the fact that the stomach is the most common site of cancer and the fact that the lymphatic connections between the regional lymph nodes of the stomach and those of the lungs are comparatively short and direct.

The essential lesion in the pulmonary complication is the filling of the lymphatics by cancer cells. This gives rise to striking appearances in both the pleura and the pulmonary tissue. The subpleural lymphatics stand out prominently above the surface, appearing as a network of yellowish white lines delineating the polygonal lobules of the lung. The cut surface shows small yellowish tubercle like specks or cylindrical plugs in the peribronchial and perivascular connective tissue which give the pulmonary tissue a finely mottled and streaky appearance. Both lungs are always affected, but one lobe may be more involved than another. Pulmonary edema is common, and pleural effusion occurs occasionally.

According to the theory most generally accepted, generalized cancerous permeation of the lymphatics of the lung is due to retrograde spread following involvement of the hilar lymph nodes. However, there are two other modes by which it may occur.

1 The cancer cells may pass from the serous sac to the subpleural lymphatics of the visceral layer and extend along the pulmonary lymphatics from there.

2 They may reach the pulmonary arteries by way of the blood stream and become implanted beneath the pleura.

The frequency with which these two mechanisms are responsible for the generalized lymphatic permeation is difficult to ascertain.

In two of the author's five cases, obliterative changes of two types, thrombotic and endarteritic,

were found in the pulmonary arteries. These were believed to be due to the effects of cancer cell emboli rather than to the mere presence of cancer cells in the perivascular lymphatics. The author cites evidence in favor of this view.

The dyspnea and cyanosis, which are so frequent in these cases, may be due to various anatomical changes in the lungs resulting from the cancerous permeation of the pulmonary lymphatics. Some of the more severe cases present the clinical features of Ayerza's syndrome.

JOSEPH K. NARAT, M D

## HEART AND PERICARDIUM

Blum, L., and Gross, L. The Technique of Experimental Coronary Sinus Ligation  
*J Thoracic Surg*, 1936, 5 521

The pain of angina pectoris is probably the result of myocardial ischemia due to sclerotic narrowing or occlusion of the coronary artery which may be followed by thrombosis. The most frequent site of this lesion in the human heart is the left anterior descending branch approximately 2 cm below the ostium of the left circumflex coronary artery. Three vascular mechanisms in the blood supply of the human heart probably serve as compensatory means of warding off the results of coronary artery narrowing or occlusion. These are the intramyocardial anastomoses, pericardial fat vessels, and anastomoses between these two and extracardiac vessels.

Attempts have been made to increase the blood supply to the heart by producing pericardial adhesions. The authors describe a relatively simple technique for performing coronary sinus obturation which appears to produce a rapid and dramatic increase in the extent of the coronary tree of the dog's heart. The dilatation of the intramyocardial collateral circulatory channels thus produced is apparently so extensive and abundant that in the majority of dogs' hearts prepared in this manner it becomes difficult or impossible to induce infarction by subsequent acute occlusion (division between ligatures) of the left anterior descending branch 2 cm below the aortic ostium of the left coronary artery. Without such preliminary coronary sinus ligation, occlusion of the left anterior descending branch at the site indicated almost invariably produces extensive infarction in the dog's heart. Under pernocton and nembutal anesthesia, the right fifth intercostal space is opened, the pleural cavity entered, and the right lung compressed. Artificial respiration is then begun, the pericardium is opened parallel with and 0.5 cm anterior to the phrenic nerve, and the coronary sinus, which lies on the posterior aspect of the base of the heart, is ligated by passing a suture on a curved needle under it near its termination in the right auricle. Following the ligation the pericardium is closed and the chest wall repaired.

After the coronary sinus ligation is tied there is a definite slowing of the heart rate and the contractions appear to be more forceful. That these changes are not due simply to manipulation is evident from

the fact that if the coronary sinus is torn or a loose ligature is applied around it, the rate either remains unaltered or becomes increased. The next change noted is a definite and gradually increasing cyanosis of the entire heart. The surface veins and coronary sinus dilate markedly as soon as the ligature is tied, but the color change of the myocardium does not appear until several minutes later. The latter persists for at least one month after the operation. At reoperation, adhesion has been found to occur with any frequency only along the line of pericardial closure. Within one week the site of ligation is covered with visceral pericardium. **MANUEL E. LICHTENSTERN, M.D.**

**Mautz F. R.** Reduction of Cardiac Irritability by the Epicardial and Systemic Administration of Drugs as a Protection in Cardiac Surgery. *J Thoracic Surg.* 1936 5 612

In a study of disturbances of cardiac rhythm associated with cardiac surgery one or more of the following disturbances were noted in every cardiac operation: (1) sinus tachycardia, (2) heart block, (3) extrasystoles, (4) induced by the surgeon, (5) spontaneous, (6) ventricular tachycardia, (7) auricular fibrillation and (8) ventricular fibrillation.

All of these disturbances have been produced and studied in dogs. They were noted also in 12 patients upon whom a heart operation was performed by Beck.

It has been demonstrated experimentally that the surface irritability of the heart can be decreased by local application to the epicardium of metyline and procaine or by the introduction of a 10 per cent solution of these drugs into the pericardial cavity. The only drug found by adequate study to be of definite value when given orally or subcutaneously is quinidine sulphate.

In excessive amounts these drugs are toxic. Careful observations and experience will be necessary to determine their value. **GEORGE A. COLLETT, M.D.**

**Hosler, R. M. and Williams J. E.** A Study of Cardiac Pericardial Adhesions. *J Thoracic Surg.* 1936 5 619

The authors state that although it has been generally believed that pericardial adhesions play an important rôle in the production of cardiac hypertrophy, experimental and autopsy evidence indicate that this theory is incorrect.

In experiments on dogs, extensive intrapericardial and extrapericardial adhesions were produced without the production of the slightest degree of hypertrophy of the heart.

In the autopsy records of the University Hospitals of Cleveland for the period from 1906 to 1935 the authors found 76 cases of extensive pericardial adhesions. In the 54 in which the heart had undergone hypertrophy concomitant heart or valvular disease was present to a degree sufficient to account for the hypertrophy. In 22 cases the heart was either normal in size or smaller than normal and entirely free from valvular and vascular disease.

The authors conclude that adhesions do not cause circulatory embarrassment unless they are extensive enough to cause cardiac compression, angulation or torsion. They believe that the indications for the Brauer operation have been made too broad and that the beneficial results of the procedure have probably been over-estimated.

**GEORGE A. COLLETT, M.D.**

**Cushing, F. H. and Feil, H. S.** Chronic Constrictive Pericarditis. Electrocardiographic and Clinical Studies. *Am J M Sc.* 1936, 191 317

The authors report observations made in 11 cases of chronic constrictive pericarditis with increased intrapericardial pressure. In all of the cases operation was performed and sections of the resected pericardium were studied microscopically. The peritoneal and visceral layers of the pericardium were found to be fused and indistinguishable from each other. In some instances areas of calcification were observed.

In every case electrocardiographic studies were made. Common to all of the records was a voltage of the QRS complex below the usual limits of normal slurring of the QRS complex in all leads and T waves of low amplitude either of positive or of negative sign. An interesting finding was the presence of P waves of normal voltage. In 7 cases change of position did not appreciably affect the electrical axis and in 3 it changed this axis only slightly. In 1 case this test was not made.

In 4 cases electrocardiograms were made also during the operation. They showed remarkably few changes. In 3 cases ventricular extrasystoles were noted while the pericardium was being dissected from the heart. Also in 3 cases there was a transient change in the mechanism shifting pacemaker occurring twice and nodal rhythm once. In 2 cases there was a slight elevation of the ST interval in the first and second leads during the operation but this disappeared before the operation was completed.

In the majority of the cases the low amplitude of the QRS complex and of the T waves was due to fluid or the dense adhesions around the heart. Severe myocardial damage as the cause was difficult to reconcile with the clinical history. In 2 cases the increased voltage during recovery from the operation in 4 cases and the absence of myocardial involvement demonstrated at postmortem examination in 3 cases.

**J. DANIEL WILKINS, M.D.**

## ESOPHAGUS AND MEDIASTINUM

**Desplas, B. and Aimé, P.** Two Cases of Hypertrophic Stenosis of the Cardia (Deux cas de sténose hypertrophique du cardia). *Médec Acad de Chir., Par.* 1936, 61 843

The first case reported was that of a man forty-eight years of age. At operation an olive-shaped fibrous mass was found surrounding the sphincter. This was divided down to the mucosa. When last seen, the patient had been well for a year.

The second case was that of a woman twenty years old who had been operated upon by Kuess for typical cardiospasm. Kuess found no mechanical cause for the obstruction. The operation consisted of incision of the wall of the cardia down to the mucosa. Relief of the symptoms was only temporary. At a second operation, Deplas found a fibrous ring about the cardia extending vertically a distance of 4 cm. He sectioned the wall down to the mucosa as Kuess had done. When seen a month later the patient was free from symptoms.

Like Dufour, Deplas recognizes a resemblance between stenosis of the cardia and the hypertrophic pyloric stenosis of infants.

Noteworthy in both of the cases reported in this article was the complete failure of atropin and dilatation by bougies to influence the symptoms.

Nine roentgenograms are presented.

ALBERT F. DFGROAT, M.D.

Negus, V. E., Kelemen, G., Kelly, A. B., Watson-Williams, E., and Others. Non-Malignant Obstruction of the Esophagus. *Proc. Roy. Soc. Med., Lond.*, 1936, 29, 903.

Negus stated that webs at the cricopharyngeal fold cause difficulty in swallowing over a period of years. The esophageal lumen may be reduced to minute size. Treatment consisting of enlargement of the lumen by a series of bougies is simple and effective.

Chronic hypopharyngitis will eventually lead to obstruction because of cicatricial contraction of the mucous and submucous layers. The treatment indicated is dilatation. When ulcerations are present dry hsmuth powder is used to cover them. In long standing cases malignant changes may occur.

Pharyngeal diverticulum may cause obstruction when the pouch becomes filled and presses upon the esophagus. Advanced cases call for excision of the diverticulum.

Stricture following the swallowing of corrosives occurs in most cases in two regions of the esophagus: the cricopharyngeal fold and at the level of the left bronchus. No attempt at dilatation should be made during the acute stage. Dilatation should be gradual. Gastrostomy may be required. This may be followed by retrograde bouginage. If the lumen of the esophagus cannot be restored, an external gullet may be constructed.

Stenosis following the impaction of a foreign body may occur when the object remains in the esophagus for a period of months.

Stenosis following specific fevers, syphilis, or peptic ulceration is rare, but occurs occasionally. In appearance it resembles stenosis produced by corrosives.

Simple neoplasms cause obstruction of the esophagus extremely rarely.

External pressure causing esophageal obstruction may be produced by a chondroma of the cricoid cartilage, thyroid tumors (are usually malignant), mediastinal tumors, and aneurisms.

Congenital shortening of the esophagus causes dysphagia in children. Negus discussed the treatment of symptoms attributable to dilatation of the part of the stomach lying above the diaphragm, and the treatment of the cicatricial stenosis causing the dysphagia.

Esophagectasia, a wide dilatation of the esophagus from the level of the diaphragmatic orifice upward, has many explanations and just as many possible means of treatment.

KELEMEN discussed the antetoracic plastic operation for impermeable strictures of the esophagus. It consists of five stages: (1) bringing the stump of the esophagus to the surface on the left side of the neck above the clavicle, (2) forming a tube from the skin of the anterior chest wall, (3) drawing forward a loop of jejunum and preparing a jejunoostomy on the abdominal wall, (4) uniting the opening of the esophagus with the upper end of the skin tube, and (5) uniting the lower end of the skin tube to the jejunostomy.

Kelemen has completed twenty-four such operations.

KELLY reported a case of esophageal stenosis of unknown origin in a child three and a half years old. The obstruction, when examined post mortem, suggested corrosive stricture, but no history of such cause could be obtained.

Vallecular dysphagia is a peculiar condition not yet fully explained. It is due to the pressure of food particles in the valleculae, which can be dislodged only by severe coughing or straining.

Kelly reported also a case of ascending fibrosis of the esophagus in an infant five months old. Histological examination post mortem showed that the fibrosis began at the lower end of the esophagus and reached the level of the bifurcation.

TILLEY reported a case with x-ray evidence of a "tumor" in the right mediastinum pressing upon the esophagus. A few days after an endoscopic examination the "tumor" disappeared and the obstruction was relieved. A suppurating tuberculous gland had burst and drained itself.

WATSON-WILLIAMS discussed three cases of peptic ulcer of the esophagus without stricture. All were treated early with alkalis.

J. DANIEL WILLIAMS, M.D.

Loeper, Riom, and Perreau. Nerve Syndromes in Cancer of the Esophagus (Syndromes nerveux dans le cancer de l'oesophage). *Presse méd., Par.*, 1936, 44, 1025.

Esophageal cancer occurs in the cervical part of the esophagus in about 18 per cent of cases, in the middle or bronchial region in 36 per cent, and in the lower or diaphragmatic region in from 46 to 48 per cent. The nerve symptoms depend upon the site of the lesion. Posteriorly the esophagus is in contact with the spinal column and therefore with the exits of the intercostal nerves and the cords of the sympathetic. In the upper part of its course it is in contact with the superior laryngeal nerve, pressure

on which may affect the sensation of the larynx. Pressure on the recurrent laryngeal nerve may cause paralysis of the vocal cords. Pressure on the pneumogastric nerve respiratory and circulatory disturbances, and pressure on the sympathetic and intercostal nerves vascular syndromes, pain, sweating and eye symptoms.

In some cases cancer of the esophagus causes symptoms at a distance. There may be pressure not only from the tumor but also from mediastinitis and suppuration of glands. The reaction caused by suppuration of glands depends upon the site of the glands.

Salivation in the course of cancer of the esophagus is a sign of irritation of the vagus. It is determined by a reflex which follows the centripetal fibers of the vagus to the medulla and is propagated to the salivary nerves. It is a frequent if not a constant sign of cancer of the esophagus.

Pain occurs in only from one fourth to one third of the cases. The dysphagia is usually simple but may be painful. In some cases the pain is at a distance from the compression and propagation and its localization suggests another disease. The authors report the case of a woman 63 years of age who had pain in the right shoulder suggesting rheumatic arthralgia or vertebral arthritis. The general condition however suggested cancer and there was a history of dysphagia. Roentgen examination confirmed the diagnosis of cancer of the esophagus. This patient also presented tachycardia not affected by pressure on the eyeballs. Autopsy disclosed a tumor of the lower part of the esophagus involving the vagus. Another of the authors' patients suffered from cervical pain on the left side which radiated to the jaw and suggested vertebral tuberculosis or cervical radiculitis. This pain was increased by the swallowing of hot foods. Examination revealed adenopathy of the left carotid chain extending to the supraclavicular fossa. The upper part of the larynx was fixed. Esophagoscopy disclosed a esophageal lesion at a point 11 cm from the mouth.

Instead of pain nerve pressure may cause paralyzes cough disturbances of phonation and even laryngeal crises with suffocation. Aphonia is seldom complete as involvement of both vocal cords is rare. The cord is generally in a median rather than a cadaveric position. Therefore while the abductor or dilator muscles of the larynx are affected the adductors or constrictors are not.

The authors report a case in which there were laryngeal crises resembling tabetic crises. The patient had syphilis and tabes was suggested by inequality of the pupils, a sluggish reaction of the pupils to light and a decrease of the patellar and Achilles tendon reflexes. However roentgenoscopy showed a cancer of the esophagus.

Involvement of the superior laryngeal nerve causes anesthesia of the larynx. Dyspnea is not unusual and may be of a suffocating character suggesting asthma. Anginal pain may occur. The authors report a case in which angina and the pupil

reactions suggested syphilitic aortitis. Esophagoscopy disclosed a cancer of the esophagus. The diagnosis was confirmed at autopsy.

Irritation of the lower end of the pneumogastric may cause hypotension and bradycardia and irritation of the upper end, hypertension and tachycardia. Pupil disturbances from pressure may suggest syphilis of the aorta or nervous system. About 60 per cent of persons with cancer of the esophagus have syphilis.

There are therefore many nerve symptoms in cancer of the esophagus which if not understood may lead to erroneous diagnoses.

ANDREW GOSW MORGAN, M.D.

### MISCELLANEOUS

Ellis, D. C. Wounds of the Thoracic Viscera. *J. Am. M. Ass.* 1930 10, 121.

The author reviews 533 cases of wounds of the thorax sustained in civil life which were treated in the period from 1921 to 1935. In 324 cases the wounds were caused by a knife in 10, by a pistol or shotgun and in 93 by an ice pick.

Pleuropulmonary wounds may be divided into (1) those with open wounds of the thoracic wall and (2) those with closed wounds of the thoracic wall. The former are the more serious because of contamination and the possibility of injury to the viscera. If the opening is smaller than the opening of the larynx the lung collapses but partial expansion occurs on inspiration and respiration is only slightly embarrassed. If the opening is larger than the larynx air will enter more freely than through the trachea and mediastinal flutter will occur. The clinical picture is one of terror, air hunger and eventual asphyxiation. The cardinal principle in the treatment of open thoracic wounds is immediate closure of the opening.

The chief problem in the treatment of thoracic injuries sustained in civil life is presented by closed wounds and accompanying conditions arising from injury to the thoracic viscera. With the exception of operative interference for heart wounds, large lacerated wounds of the lung, hemorrhage from an intercostal or internal mammary vessel or compression pneumothorax the treatment in the cases reviewed was usually conservative and non-operative. The most frequent complications were hemithorax, pneumothorax, hemothorax, hemothorax and subcutaneous emphysema. The clinical picture was one of dyspnea, painful respiration, and hemoptysis.

Hemothorax due to hemorrhage from the lung, heart or an internal mammary or intercostal vessel occurred in 37 per cent of the cases. Unless massive hemorrhage appears, conservative treatment with bed rest, the administration of morphine for relief of pain and frequent aspiration of bloody fluid seems to be the treatment of choice. In the author's cases aspiration is now done only for the relief of pain and dyspnea. The mortality in the reviewed cases treated conservatively was only 6 per cent.

Pneumothorax occurred in 24 per cent of the cases. It rarely required treatment other than rest and the administration of morphine. In closed pneumothorax, lung expanding exercises, as with blow bottles, can do no good and may cause harm. Compression pneumothorax, caused by valve like action of a wound in the lung or bronchus, requires immediate treatment. The symptoms are rapidly increasing air hunger and cyanosis, with displacement of the mediastinum toward the uninjured lung. The treatment indicated is removal of the air by suction or the introduction of a water sealed intercostal tube of sufficient size to allow its escape.

Hemopneumothorax occurred in 36 per cent of the cases. Its symptoms and treatment are similar to those of hemothorax and pneumothorax.

Subcutaneous emphysema occurred in 40 per cent of the cases. As a rule it was of slight extent and rapidly absorbed, and required no special treatment. Mediastinal emphysema occurs when pleural air escapes directly into the mediastinum and spreads upward in the neck and over the body. This condition is dangerous because of the pressure produced on the trachea, and should be treated by incisions in the suprasternal notch.

Injuries of the heart such as rupture and large lacerations are frequently fatal almost at once. Non-penetrating injuries of the heart which are not fatal have received little attention. The most common cause of such injuries are accidents in which the driver of a car is thrown forward against the steering

wheel. The sudden compression thereby produced may injure the heart without fracturing the ribs or the sternum. Heart injury should be suspected when a thoracic injury is followed by precordial pain, dyspnea, and tachycardia. Persistence of these symptoms, together with irregularity of the heart beat, cyanosis, and a peculiar "tick tack" heart sound, makes the diagnosis almost certain. After a penetrating wound of the heart there is usually a history of absence of symptoms for a few minutes and then collapse. External bleeding is profuse at first, but is checked when the collapse occurs. Both the collapse and the arrest of the hemorrhage are due to tamponade of the heart. The pulse is weak or absent, the arterial pressure low, the venous pressure raised, and there is very little cardiac movement. The treatment should be entirely symptomatic, reliance being placed chiefly on the use of morphine, sedatives, and oxygen.

Contrary to general opinion, infection of the pleura and thoracic viscera rarely follows penetrating wounds of the thorax.

In the 553 cases of thoracic injuries reviewed the mortality due directly to the injury or complications resulting from it was 6 per cent.

The author emphasizes chiefly (1) the conservative nature of the treatment in practically all of these cases except those of wounds of the heart, in which operative procedures were necessary, and (2) the importance of immediate closure of open thoracic wounds.

FRANK STITCHFIELD, M D

# SURGERY OF THE ABDOMEN

## ABDOMINAL WALL AND PERITONEUM

Cottalorda and Escarras Considerations on the Diagnosis and Treatment of Strangulated Obturator Hernia Based on Three Personal Observations (Considérations sur le diagnostic et le traitement des hernies obturatrices étranglées d'après trois observations personnelles) *J de chir* 1936 48 22

As a rule the signs of strangulated obturator hernia are described as cardinal and accessory. The cardinal signs are those of intestinal obstruction and those of intestinal occlusion such as tumefaction. Intestinal obstruction, while one of the most important signs is quite frequently the source of error as the physician often fails to make a sufficient effort to determine its site and, because of the rarity of strangulated obturator hernia, fails to consider that condition as a possible cause. The accessory signs of strangulated obturator hernia are pain in the obturator region which may radiate to the knee, the position of the leg which is in flexion and rotation and localizing signs such as a sensation of pressure above the pubis and pain on vaginal examination and on the palpation of the obturator region. Occasionally it is possible to feel a deep and painful tumefaction in the region of the obturator foramen.

The authors believe that these accessory signs are of more importance in the diagnosis of obturator hernia than the signs of obstruction. They describe three forms of the condition. The first is the pure occlusive form in which there are no localizing signs, the second the form in which there is evidence of intestinal obstruction with localizing signs indicating that the lesion is in the obturator region and the third a rarer form probably seen only in the very early stage, in which there are localizing signs without intestinal obstruction.

Previous operative techniques are reviewed rather briefly. They consist of herniotomy, herniotomy plus laparotomy, laparotomy, laparotomy followed by herniotomy, and variations of these procedures. Because of the inaccessibility of the obturator region a proper incision is extremely important. This requires an accurate diagnosis before operation. The authors believe that an accurate pre-operative diagnosis is possible in the vast majority of cases if the condition is considered in the differential diagnosis.

Proper treatment requires (1) confirmation of the diagnosis, (2) reduction of the hernia, (3) treatment of the sac, and (4) closure of the obturator orifice. In the authors' opinion the procedure of prime importance in strangulated obturator hernia is a subcutaneous laparotomy to prove the presence of and to reduce the hernia. To dissect the sac and close the obturator opening it is often necessary to make a secondary incision over the foramen. This

operation the authors consider secondary. Therefore they divide their operative technique into 2 stages. The first is abdominal and obligatory. Local anesthesia is used and an incision made parallel with and about 2 fingerbreadths above Poupart's ligament and extended from the antero-superior spine to above the pubic spine. As a rule ligation of the epigastric artery is necessary. The peritoneum is opened and the hernia reduced. If it is impossible to dissect the sac through this incision and the patient is in good condition the second stage of the operation is done. An incision parallel with the adductor fibers is made from the horizontal arch of the pubis downward about 4 fingerbreadths. A line of cleavage is found between the pectineus muscle and the middle adductor. The obturator region is brought into view and the hernial sac treated through this approach. In many cases this second stage is unnecessary.

The authors' three cases are reported and their operative procedure is shown by illustrations.

NATHAN A. WOMACK, M.D.

Leriche R. Fontaine R. and Kunlin J. Experimental Studies on Mesenteric Infarction (Recherches expérimentales sur l'infarctus du mésentère) *J. Internal de chir* 1936 2 437

Intestinal infarction was studied in dogs, to determine the conditions under which white and red infarct occur and the influence of vasomotor changes on the extent and character of the lesions.

According to the original conception of Laennec true infarction always involves interstitial hemorrhage. White infarction, which the authors believe should be called "ischemic necrosis," is rare and can be produced experimentally only by washing out the blood from an area at the time that its artery is ligated. For its spontaneous occurrence vasomotor conditions causing emptying of the vessels of the ischemic area are necessary.

The results of ligating the superior mesenteric artery at various levels are inconstant, being determined by the condition of the artery and by the blood pressure, that is to say, by the age and health of the animal. This accords with the pathology of mesenteric thrombosis in man. In dogs the critical level appears to be between the sixth and seventh branches of the mesenteric artery counting from the periphery. The application of a ligature here is always followed by infarction.

That arterial spasm alone is capable of causing infarction was proved by injecting epinephrin into the superior mesenteric artery. Injections at the level of both the fourth and second branches gave positive results.

The infarction that results from ligation of the superior mesenteric vein is rapid in its development.

and quickly fatal. To produce it constantly the ligature must be placed on the trunk of the vein above the origin of the collaterals.

In a study of the influence of the sympathetic innervation it was found that by resection of the lumbar sympathetic chains and the superior mesenteric plexus the effects of ligation of the superior mesenteric artery could be greatly mitigated. In one experiment infiltration of the nerves with novocain was successfully substituted for resection.

The authors believe that in mesenteric occlusion in man a sympathectomy of some form should be done with the usual operative procedures because the development of an infarct is dependent upon functional changes in the circulation quite as much as upon the original anatomical lesions in the vessels.

The article contains ten illustrations of experimental specimens. ALBERT F. DEGRAT, M.D.

### GASTRO-INTESTINAL TRACT

Hillemand, P., Garcia-Caldéron, J., Aubrun, W., and Artisson, H. Diverticulum of the Pole of the Fundus of the Stomach (*Le diverticule du pôle de la grosse tubérosité de l'estomac*). *Presse méd., Par.*, 1936, 44, 1011.

The authors report, with roentgenograms, two cases of diverticulum of the tip of the fundus of the stomach. Quite frequently such diverticula are latent clinically, but in these cases the patients suffered attacks of burning pain in the stomach which came on from an hour and a half to three hours after meals. They had also intestinal hemorrhages for which no other cause could be found.

The article deals chiefly with the roentgen picture and the pathogenesis of the lesion. The diverticulum produces a vertical shadow which may lie within or outside of the stomach area. Sometimes it does not become visible until after the stomach has been completely filled or pressure is made on the fundus region. In some cases it can be seen only when the patient is lying down. Sometimes it is invisible at the first examination. This is explained by obstruction of the pedicle by inflammation. Often the diverticulum must be studied in different incidences to disengage its shadow from the shadow of the stomach. Often the right anterior oblique or profile position shows it up best, both when the patient is standing and when he is lying down. The Trendelenburg position facilitates the filling of the diverticulum.

The diverticula are generally solitary. They vary from the size of a pea to that of the head of a newborn infant. Their form depends upon the position in which the patient is examined. When the patient is standing it is round or oval or the shape of a glove finger. In dorsal decubitus with slight inclination to the left it appears to be a continuation of the apex of the fundus. This appearance is characteristic of diverticula of the posterior wall, which are the most frequent. Dorsal decubitus is the best position for roentgenography of the diverticula. They are

often overlooked because roentgenograms are not made in this position. As characteristic signs of subcardiac diverticula Akerlund cites their rounded form, their different degrees of filling and distention, and the suppleness and mobility of their outlines without roentgen signs of infiltration around them.

Such diverticula are found normally in certain lower species of animals, notably the hog and certain species of monkeys. The author therefore believes that they represent reversions to an earlier form. This theory is supported by the frequent presence of accessory pancreatic tissue in the walls of the diverticula. As gastric diverticula are almost constant in the human embryo, their presence in the adult is to be ascribed to the persistence of an embryonic characteristic.

AUDREY GOSS MORGAN, M.D.

Friberg, S. End-Results in Gastric Surgery with Special Reference to "Resection for Exclusion." *Acta chirurg. Scand.*, 1936, 78, 157.

Finsterer reported his preliminary results from "resection for exclusion" in 1918. The operation consisted of resection of the pylorus followed by radical resection of the stomach and terminolateral gastrojejunostomy. Finsterer's method gained many advocates, but also met with opposition, particularly from von Haberer and Friedemann who claimed that it had no advantages over a simpler gastroenterostomy, that it was associated with just as great risks of postoperative hemorrhage and perforation, and that it would be followed by jejunal ulcer just as often as pyloric exclusion alone. As performed today, resections for exclusion may be divided into 2 groups: (1) those in which the pylorus but not the ulcer is resected, and (2) those in which neither the ulcer nor the pylorus is resected.

Friberg reviews 308 surgically treated cases of ulcer. In 68, resection for exclusion was performed with 3 deaths. In 24 of the latter the pylorus was resected. The 3 deaths occurred in the remaining 44 cases in which the pylorus was left *in situ*. One death was that of a man seventy-two years old who died of heart failure. The 2 others were secondary to peritonitis due to perforation of the excluded ulcer, a complication which is fairly rare, as is demonstrated by the reports of other surgeons performing resection for exclusion. The mortality of 4.4 per cent is contrasted with the mortality of 5.45 per cent in the cases which were treated by gastroenterostomy and 12.6 per cent in those which were treated by radical resection.

The incidence of satisfactory end results after various types of operations was as follows: Billroth I operation, 66.7 per cent, transverse resection, 90.5 per cent, Billroth II operation, 85.7 per cent, resection for exclusion, 87.7 per cent, and gastroenterostomy, 70.2 per cent. In the cases in which resection for exclusion was done the end results were equally satisfactory whether the pylorus was left *in situ* or removed. In none was the operation followed by pernicious anemia. SAMUEL J. FOGELSON, M.D.



Minnes J F and Geschickter C F Benign Tumors of the Stomach *Am J Cancer*, 1916, 28 136

Benign tumors of the stomach which are frequently confused clinically with malignant and in inflammatory lesions may give rise to complications demanding immediate surgical intervention. The authors report the clinical and pathological features of 50 benign tumors of the stomach recorded at the Johns Hopkins Hospital Baltimore in the period from 1889 to date.

Benign tumors may arise from the mucosa submucosa muscularis or serosa of the stomach. According to the tissue of origin they may be divided into 2 groups: the epithelial and the mesenchymal. Among the epithelial tumors are adenomas adenopapillomas adenomyomas and fibro adenomyomas. Chief among the mesenchymal tumors are the leiomyomas fibromas lipomas neurofibromas and the rare angiosarcomas and osteomas. Finally there is a group of lesions which though usually included with tumors are not truly neoplastic. These include simple blood or lymph cysts dermoid cysts echinococcus cysts and embryonic rests of the pancreas.

Of the benign tumors of mesenchymal origin the leiomyomas are by far the most common. Neurofibromas are not infrequent. Hemangiomas are much rarer. Cysts other than simple cysts are extremely rare. Of the 26 cases of polypoid tumors reviewed by the authors the neoplasms were multiple in more than 50 per cent. While benign tumors do not occur much more frequently in one part of the stomach than another they are slightly more common in the pyloric region than elsewhere. In the reviewed cases the majority of the neoplasms were the size of a pea or smaller. Only 2 were as large as a hen's egg. One of these was a neurofibroma situated at the cardia and the other an adenoma located in the pyloric region. The mesenchymal tumors may be sessile or pedunculated. They lie within the wall of the stomach, project into its lumen or remain subserous and project into the peritoneal cavity. They are usually small but sometimes grow to a tremendous size.

The epithelial tumors may be divided into 2 groups: the adenomas and the adenopapillomas. The adenomas arise from the mucosa as reddish friable button like or lobulated masses. The adenopapillomas form cauliflower like projections of varying size within the lumen of the stomach. They are friable and frequently ulcerated. It is tumors of this type that may cause pyloric obstruction. There is considerable evidence in the literature to show that benign adenomas and adenopapillomas may develop into cancer.

Of the benign tumors reviewed by the authors 26 occurred in white and 3 in colored patients. The ratio of males to females was 39:11. The youngest patient was 21 years of age and the oldest 94. The tumors developed most frequently in the fifth and sixth decades of life. Their maximum incidence was between the seventy-fifth and eightieth years.

In the diagnosis little reliance can be placed upon the clinical features. Symptoms, when present are dependent upon a complication such as obstruction, ulceration, or hemorrhage. The size and position of the tumor are important. The tumor is rarely large enough to be palpable through the anterior abdominal wall. Not infrequently, tenderness and muscle spasms in the epigastrium are noted. The hydrochloric acid content of the gastric juice is of equivocal value. As a rule it is diminished or entirely absent but there are reports of cases in which it was increased. The frequency of correct diagnosis of benign gastric tumor has been increased by expert roentgen examination of the stomach.

As the sudden development of a complication such as hemorrhage may cause death as annoying and even dangerous symptoms or complications may occur at any time and as tumors of the epithelial group not infrequently become malignant, benign neoplasms of the stomach should be removed as soon as they are recognized. If the tumor is single and circumscribed simple excision with a good margin of healthy tissue will suffice but in cases with multiple tumors scattered diffusely over the gastric mucosa resection of the stomach sufficient to remove all of the diseased area should be done.

JOSEPH K. SARAT, M.D.

Ssamarin N. N. Observations on Total Occlusion of the Digestive Tube (*Observations sur l'occlusion totale du tube digestif*) *Lyon chir.* 1936 33 353

The differences between high and low intestinal obstruction are shown by a number of factors:

1. The period of survival. In high obstruction the period of survival is only one or two days; in low obstruction it ranges from ten to forty even days.
2. Chemical changes in the blood. In high obstruction the blood chlorides are decreased and the alkaline reserve is increased. In low obstruction there is no striking change.
3. Morphological changes in parenchymatous organs. While changes occur in the liver, pancreas, kidneys and heart in all obstructions they are most marked in high obstruction.
4. The cycle of secretion of the digestive glands. The total secretion of the digestive glands in twenty-four hours is estimated to be equal to the total quantity of blood and lymph. Normally, this is largely resorbed. In high obstruction it cannot be resorbed and either accumulates in the intestinal lumen or is lost by vomiting. In low obstruction much of it may be resorbed. There is experimental evidence that secretion is increased and absorption is decreased in obstruction. The author has prolonged the life of animals with high obstruction by injecting the upper intestinal secretion of normal animals into the intestines below the obstruction. Dehydration and lowering of the blood chlorides are secondary to loss of the digestive juices.

Ssamarin believes that the air normally swallowed with ingested food is of importance for normal per-

stalsis. Experiments which he and Nadene carried out led him to the conclusion that the feebleness of the gastric and intestinal peristalsis in esophageal obstruction, for example, is due to absence of the primary stimulation of swallowed saliva and air.

He believes that replacing the lost blood chlorides by the injection of hypertonic saline solution should be delayed until after relief of the obstruction, first because the injected chloride quickly leaves the blood to accumulate in the intestinal lumen, and second, because the injection of hypertonic saline solution stimulates peristalsis which is not desirable while the obstruction persists. Dehydration should be treated by the subcutaneous or rectal injection of physiological saline solution.

Although Samarin does not believe that the stagnant intestinal contents above an obstruction are toxic or that it is dangerous to allow them to pass through the intestine below an obstruction, he warns against 'milking' this fluid out of the intestine as this procedure traumatizes the wall and causes shock and intestinal paralysis. He recommends radical relief of the obstruction, multiple enterostomies to restore the distended bowel to normal size rapidly, the intravenous administration of hypertonic saline solution after release of the obstruction, and multiple blood transfusions. MAY M. ZWINGER, M.D.

Bargen J. A. and Barker, N. W. Extensive Arterial and Venous Thrombosis Complicating Chronic Ulcerative Colitis. *Arch. Int. Med.*, 1936, 58, 17.

The six cases reported in this article came under the authors' observation in the last two years. Nine other cases cited were observed in the previous eight years. Because some of the patients received the anticolitis serum, it might be assumed that the thrombosis occurred as the result of its administration. However in one case in which the thrombosis was severe, the patient received no serum and this phenomenon has occurred in many other cases in which serum was not employed.

It is of interest that all of the patients were young adults between the ages of nineteen and thirty-one years. At the time of the development of the thrombosis the patients had been at rest in bed for several days or weeks and therefore had been subjected to venous stasis in the lower extremities. All but one had a rather marked secondary anemia. In all large veins, such as the femoral and iliac veins and even the vena cava, were involved. All had severe chronic ulcerative colitis with fever and evidence of toxemia. In two, colonic perforation occurred. In the cases in which roentgen examination was possible the roentgenograms revealed extensive intestinal disease. According to the authors' experience it is only in cases of the most severe involvement with very acute exacerbations of the disease that roentgenography is inadvisable. The specimens obtained at autopsy demonstrated the markedly destructive nature of the colonic process in the cases in which death occurs. Local or diffuse peritonitis, or at least peritoneal irritation, was also present in the fatal cases.

The pathogenesis of venous thrombosis and thrombophlebitis is still debatable. Their occurrence as complications of various severe infectious diseases which are accompanied by generalized toxemia, particularly typhoid, pneumonia, and influenza, was reviewed by Welch in 1898. They are found also in association with anemia. In some of the early cases reported they were associated with chlorosis in which there was no evidence of infection. Rest in bed with resulting venous stasis is considered to be a factor in certain cases, particularly those of postoperative thrombophlebitis (Robertson). It is not surprising, therefore, that thrombosis of the veins of the legs should complicate chronic ulcerative colitis, in which all three factors—severe infection with toxemia, anemia, and venous stasis—are present. An inciting factor may be local damage to the large iliac veins resulting from the neighboring peritonitis. Thrombi may form also in small veins of the rectum close to ulcers and propagate through branches of the hypogastric to the common iliac veins. Arterial thrombosis has been described as a rare complication of typhoid, pneumonia, and influenza as well as other infectious diseases. However, it has not been described as occurring in chronic ulcerative colitis, and such a progressive and extensive simple arterial thrombosis with venous thrombosis as was seen in one case is rare in young persons whose arteries are otherwise normal.

The histopathological picture and the location of the involvement chiefly in large venous trunks show that the thrombosis associated with chronic ulcerative colitis is out of all proportion to any changes which can be seen in the vessel walls. There may be a small focus of inflammation in a vessel which acts as a starting point but the extensive propagation of the thrombus suggests that there is also an increased tendency of the blood itself to produce thrombosis. Such evidence of phlebitis or arteritis as is seen in the sections is minimal and can be interpreted as being chiefly secondary to the thrombus. Attempts at organization of the thrombi are slow and feeble.

In a series of cases of chronic ulcerative colitis seen at the Mayo Clinic the incidence of massive thrombosis in the vessels of the legs was slightly more than 0.1 per cent. This complication must be regarded as of serious prognostic import. In three of the six cases which are reported the patient died. The deaths were caused by toxemia and not by embolism. It seems probable that the thrombosis in such cases is caused by the combination of local infection, generalized toxemia, alterations in the blood, and venous stasis.

Valdes, U. Acute Appendicitis and Intestinal Obstruction (Appendicitis aguda y oclusion intestinal). *Rev. de gastro enterol. de Mexico*, 1936, 1, 441.

Following an attack typical of acute cholecystitis, a man 26 years old was found at operation to have a gangrenous appendix. Five days after he left the hospital he developed symptoms of intestinal obstruction. At a second operation total strangula-

tion of the small intestine due to multiple bands of adhesions was discovered and relieved by high enterostomy. In spite of the use of impermeable cement and powdered kaolin, a large part of the skin of the abdominal wall was destroyed by the duodenal secretion escaping from the drainage tube. The destruction was finally controlled by poultices of chopped raw meat moistened with milk, and the fistula healed. A third operation was necessitated by a small intraperitoneal abscess near the bladder. Two months later, symptoms of intestinal obstruction again appeared, and at operation total volvulus of the small intestine was found. The mass of the bowel had made a complete turn to the left around the mesenteric axis. To untwist it evisceration of the mass was necessary. Four months later the patient was in excellent condition.

The points stressed by the author are the practical impossibility, in some instances of making a differential diagnosis between acute cholecystitis and acute appendicitis, the beneficial results obtained with Levine's nasal tube and the great rarity of volvulus of the small intestine *en masse*. Valdes has found only 2 reports of such volvulus (Matry, 1930). The mechanism is difficult to explain but it is evident that in addition to an unusually long mesentery adhesions which immobilize a single loop are important. M. E. MORSE, M.D.

Hudson, H. W., Jr. and Krakower, C. Acute Appendicitis and Measles. *New England J. Med.* 1936 215 59.

Hudson and Krakower have observed 9 cases of appendicitis occurring during either the prodromal or the eruptive stage of measles, and have collected 31 such cases from the literature. In the 40 cases there were only 4 deaths.

In the authors' cases the appendices were removed, sectioned and examined microscopically and the findings compared with those in appendices removed from children with appendicitis who were not suffering from measles.

In the cases of appendicitis complicating measles there was, in general, less lymphoid tissue with practically no secondary centers or germinal follicles, and there appeared to be a greater number of plasma cells particularly in the submucosa. Especially in the earlier stages of measles, the mucosa, lymphoid tissue and submucosa showed numbers of larger cells with a basophilic cytoplasm and large prominent nuclei which were often oval or spheroidal and sometimes lobulated or distorted. Occasionally these cells had 2 or 3 nuclei. In the controls such cells were observed infrequently in the mucosa and rarely in the submucosa and lymphoid tissue. No other definite histologic differences were noted.

Of the 40 cases the appendicitis occurred in the prodromal stage of the measles in 15, in the eruptive stage in 12, and in the immediate convalescent period in 13.

The histologic differences noted and the number of cases observed led the authors to the conclusion

that there is more than a casual relationship between appendicitis and measles. While they do not state that the measles is the etiologic factor in the appendicitis, they express the opinion that there is sufficient evidence to suggest that appendicitis may be a complication of measles. They therefore urge a more careful abdominal examination in cases of measles accompanied by abdominal pain and vomiting. They believe that, as a rule, patients with appendicitis complicating measles are good surgical risks. LORNE W. CHRISTIAN, M.D.

## LIVER, GALL BLADDER, PANCREAS, AND SPLEEN

Boyce F. I. and McFetridge E. M. The So Called "Liver Death." An Experimental Study of Changes in the Biliary Ducts Following Decompression of the Obstructed Biliary Tree. *Arch. Surg.* 1936 32 1080.

Of a series of ten experiments previously reported two were successful. In the first experiment on dogs the biliary tree was obstructed for from twelve to twenty days by ligation and division of the common bile duct and cholecystectomy. After decompression by the creation of an external biliary fistula there was a prompt decrease in the jaundice followed almost immediately by listlessness, anorexia, and anuria. The animals died after from three to four days and in all of them necropsy showed degenerative changes in the liver cells and in the convoluted tubules of the kidneys which were typical of the lesions in clinical cases of liver kidney death. In the second experiment similar changes occurred after injection into the animals of saline and aqueous extracts from the liver of a patient who died a liver death after cholecystectomy. An alcoholic extract did not produce the picture.

On the basis of previous clinical and experimental evidence which has been reported the following theory to explain the occurrence of this "liver death" or "liver kidney syndrome" has been evolved.

1. The same syndrome is apparent and the same underlying factors are operative in the various conditions studied (postoperative biliary disease, postoperative pancreatic disease and hepatic trauma), and on the basis of a casual survey of unselected autopsy reports in cases of disease of the thyroid gland, burns, and intestinal obstruction, it appears that this same syndrome may develop in these and perhaps other pathological states in which it has not yet been identified.

2. The underlying factor is hepatic damage of some degree either present previously or produced by direct trauma.

3. When such a strain is superimposed on the existing hepatic disability the damaged liver cells failing in their function release into the circulation some potent toxic substance which, on the basis of experimental evidence, seems to be water soluble.

4. This substance circulating in the blood is excreted by the kidneys through the convoluted

tubules, and they, unfitted by nature for such a load, promptly break under it

5 The two types of liver death originally described by Heyd are a single pathological process. Cases in which sudden death occurs with hyperpyrexia and only hepatic changes are apparent at autopsy represent the first stage of the process which terminates in deferred death from uremia, in which renal as well as hepatic changes are apparent at autopsy.

To prove this theory both positive and negative evidence is necessary. On the positive side, the toxic substance must be isolated from the damaged liver cells. This the authors are now attempting to do. On the negative side it must be proved that the toxic substance does not originate elsewhere in the biliary system. The authors report experiments carried out by them to establish such proof.

In order to make certain that the tissues lining the biliary ducts are not involved in the production of the toxic substance, experiments were performed on twelve dogs. In six dogs used as controls, obstruction of the biliary tree was established and was not released. In the six other dogs, decompression of the obstruction was done from four to thirty six days after the production of the obstruction. The obstructions were produced by ligating and dividing the common duct near the duodenum. The clinical result of the obstruction was the same in all of the animals.

Histological study of sections of the livers of both groups of dogs showed the characteristic necrosis of the hepatic cells in the inner third of the lobule and about the large bile ducts. Since such changes take place in the liver cells, it was postulated that the lining cells of the bile ducts might show some degree of flattening. In only four animals was this the case. The change was most marked in the small ducts. The epithelium of the large ducts showed no change.

The absence of positive findings in the epithelial lining of the bile ducts is to be regarded as another link in the chain of evidence pointing to the liver cells as the source of the lethal toxin in the liver-kidney syndrome.

To explain the discrepancy between the negative results in these experiments and the reverse results reported by Stewart and Cantarow in a similar series of experiments on cats, the authors call attention to the fact that in their own experiments the obstruction was released by the creation of an external biliary fistula which is analogous to a clinical procedure, whereas in the other experiments the obstruction was released by removing the ligature on the common bile duct which had not been divided and therefore the experiments did not produce the clinical and pathological conditions usually found.

The authors made no observations of the kidneys in this series of experiments, but previous clinical and experimental studies have convinced them that the renal changes are the second stage of the syndrome. Not even the first stage was produced in these experiments. J. FOWY KIRKPATRICK, M.D.

Fitz-Hugh, T., Jr. Acute Gonococcal Perihepatitis—A New Syndrome of Right Upper Quadrant Abdominal Pain in Young Women. *Rev Gastroenterol*, 1936, 3, 125.

The author describes the syndrome of acute gonococcal perihepatitis in young women and reports seven cases.

The condition is most frequent between the seventeenth and thirty-fourth years of age. The chief complaint is severe pain in the right upper quadrant of the abdomen which simulates the pain of acute cholecystitis. Menstrual disturbances may be present. Gaseous distress, nausea, and vomiting are common. The temperature ranges from 99 to 102 degrees F. Rigidity and tenderness in the right upper quadrant may be marked, and limitation of motion of the right half of the diaphragm can often be demonstrated. A transient friction rub may sometimes be heard at the right anterior costal margin. Only rarely is there gross evidence of pelvic inflammation. The sedimentation rate of the erythrocytes is uniformly accelerated. In all of the author's cases except one, urethral or cervical smears were positive for gonococci, and in the one exception positive peritoneal smears were obtained.

The author is of the opinion that the perihepatitis is due to the perforation of a fallopian tube with gonococcal infection or spread of such infection from the tubes to the perihepatic region by way of the lymphatics. Microscopic sections of tissue removed in one of the reviewed cases showed characteristic changes of perihepatitis in the capsule extending into the parenchyma.

The acute phenomena of the perihepatitis begin to subside in from one to two weeks. The outlook is uniformly good although reinfection of the perihepatic tissues may occur and eventually "violins" adhesions may be formed.

The treatment includes rest in bed, the local application of heat, and the administration of fluids and sedatives. Later the pelvic residue of gonorrhea may require gynecological measures.

LOUIS SPERLING, M.D.

Chiray, Pavl, Lomon and Georges-Rosanoff. The Problem of Atony of the Gall Bladder (Le problème de la cholecvstatonie). *Presse méd*, Par, 1936, 44, 1001.

Chiray and his associates state that, in 1925, they, with Milobevitch, described atony of the gall bladder as a clinical entity. In this article they discuss certain points that have been brought out in the discussion of the problem.

Atony of the gall bladder, they say, is characterized by an atonic distention which is entirely independent of mechanical obstruction. There is physiologically a diminution in the normal contractions of the organ. The symptoms are a feeling of weight in the region of the gall bladder, especially in an area that is painful on deep palpation, dyspepsia with anorexia, discomfort after meals, a tendency toward nausea, and, in some cases, attacks of biliary vomit.

ing, and occasionally migraine or mental depression. On biliary drainage the B bile is found to be increased in amount, highly concentrated and dark in color. On roentgen examination the gall bladder shows characteristic passive changes in form with changes in the patient's position. It does not appear as an elastic organ regularly distended with bile. With the patient in ventral decubitus, it is elongated, and with the patient erect, it is enlarged at the base. It does not empty completely under stimulation by drugs or by gastric digestion. Most of the symptoms are rapidly relieved by medical biliary drainage.

Objection has been raised to recognition of the condition as a clinical entity on the ground that contractions of the gall bladder wall are not the essential factor in the normal emptying of the organ and the absence of such contractions will not cause symptoms. However, recent investigations especially with the new methods of visualizing the gall bladder have shown that this objection is not tenable and that the normal elasticity of the gall bladder wall is essential for gall bladder function.

The theories of Westphal and the German school with regard to vesicular dyskinesia admit the occurrence of gall bladder atony and its symptoms but confuse the condition with other disturbances of the muscular function which are entirely different. These investigators include in their conception of 'dyskinesia' all the functional disturbances of the contractility of the gall bladder and of the sphincter of Oddi which cause stasis—whether hypertonia or hypotonia—and they fail to differentiate clearly the entity of atony of the gall bladder in which the sphincters are not involved. The dyskinesia of Westphal is not a clinical entity as the various conditions to which this term has been applied cause different symptoms and require different treatments.

Others have claimed that the black bile which the authors regard as pathognomonic of atony of the gall bladder is not in reality B bile, i.e. gall bladder bile but bile of hepatic origin. It is true the authors state, that black bile may sometimes be obtained from the liver but the black bile obtained by biliary drainage in their cases of gall bladder atony is definitely B bile intermediate between A and C bile. It has been claimed by Graham Cole and others in America that gall bladder atony is not a clinical entity responsible for the symptoms described but only an element in 'habitus asthenicus' and general deficiency of muscular tonus. Certain French surgeons have claimed that gall bladder atony does not occur independently but is always associated with gastric and intestinal ptosis and that the ptosis is the cause of the described symptoms.

The authors maintain that the deficiency in the supply of normal bile in the gastro intestinal tract associated with gall bladder atony may, of itself, be a cause of the symptoms. While they admit that gall bladder atony may be associated with visceroposis or other forms of hypotonia they state that even so biliary drainage relieves the symptoms in

great part and this effect must be due to the relief of biliary stasis since biliary drainage is certainly not a treatment for visceroposis.

Others have confused atony of the gall bladder with ptosis of the gall bladder. The authors present three sets of roentgenograms. The first shows a gall bladder that is not atonic but very definitely ptosed. With the patient in the erect position, it is below the liver, but does not show the enlargement at the base which is characteristic of atony in this position or any other signs of atony. The second set of roentgenograms show a definitely atonic gall bladder with characteristic changes in shape when the position of the patient is changed, absence of normal contractions and failure to empty but in its normal position. The third set show active contractions in a gall bladder that is low.

The authors conclude that none of the objections offered is valid against their interpretation of gall bladder atony as a definite clinical entity with characteristic symptoms which are relieved by a definite method of treatment. ALICE M. MEYERS

Wilson, W D, Lehman, E P and Goodwin, W H  
The Prognosis in Gall Bladder Surgery. *J Am M Ass* 1936 106 2209

While the place of surgery in the treatment of gall bladder disease is well established there is a group of cases in which the benefits of operation are less obvious. In attempts to place individual cases in one or the other group certain criteria are to be evaluated. A patient with cholelithiasis has a better chance for relief of symptoms from operation than a patient without stones. The more severe the symptoms the more probable the relief. It is believed by many also, that the nearer the time of operation to the onset of the attack the better the prognosis for operative recovery and symptomatic relief.

With the aim of throwing light on these criteria the authors report an analysis of 610 consecutive cases of cholecystitis and cholelithiasis which were treated at the hospital of the University of Virginia during the years from 1921 to 1935. Twenty two (3.6 per cent) of the patients died in the hospital. In the cases of 447, the final results were determined by questionnaires and re examinations. The results were graded as excellent, good, fair and poor. In 91.3 per cent of the cases they fell into the first 3 groups.

The clinical cholecystographic, operative, and pathological data were analyzed by the usual comparisons of percentages and their significance was evaluated by the chi square distribution method.

No statistical significance could be attached to a comparison between the symptomatic results and such factors as age, sex, race, duration or severity of symptoms, presence or absence of jaundice, presence or absence of a history of colic, degree of functional disturbance indicated by the cholecystograms, pathological stage of the disease or type of operation.

The authors conclude that satisfactory clinical results are obtained in 79 per cent of cases of cholelithiasis, 64 per cent of cases of gall bladder disease without stones, 82 per cent of cases with a marked degree of pathological alteration of the gall bladder wall, 76 per cent of those with a moderate degree of alteration of the gall bladder wall, and 57 per cent of those with a mild degree of alteration of the gall bladder wall. The cholecystogram is a significant index of the degree of pathological change in the gall bladder. The desirability of early operation in acute cholecystitis is not proved when measured by mortality rates.

EARL GARSIDE, M D

McGowan, J M, Butsch, W L and Walters, W  
Pressure in the Common Bile Duct of Man  
*J Am Med Ass*, 1936, 706 2227

The studies reported were carried out in cases in which the gall bladder had been removed and a T tube had been left in the common bile duct for drainage. Studies of pressure were made on fifteen occasions. The subjects were eight patients, all of whom were at rest while the studies were in progress. As a rule the pressure measured by a column of fluid above the level of the abdominal wall is between 0 and 30 mm of water. Respiratory excursions cause it to rise from 5 to 10 mm of water. A more detailed report of the intraductal pressure in different conditions will be published by the authors later. It was found that  $\frac{1}{2}$  gr of morphin sulphate, given subcutaneously produced an increase in the intraductal pressure on fourteen occasions. The pressure began to rise from two and a half to four minutes after the administration of the morphin rose rapidly, and reached a plateau from ten to fifteen minutes after the injection.

The pain which followed the administration of morphin began shortly after the pressure started to rise. It became increasingly severe in the next ten minutes and then, doubtless because of the analgesic action of morphin on the higher nerve centers, gradually became less severe.

Pain persisted throughout the whole time of the rise in pressure, which was about two hours. Because of inconvenience to the patients, the pressure curve was followed to its conclusion on only two occasions. Under the influence of morphin the pressure rose from 0 to 200 or 350 mm of water. The perfusion pressure was also elevated, usually from 140 mm to from 400 to 600 mm of water.

The point and mode of action of morphin on the biliary system offer a large field for speculation. This much evidence is available.

1 After the administration of morphin fluid can be made to flow from the common bile duct into the duodenum only by increasing the pressure. In other words the perfusion pressure is increased.

2 Roentgenograms made before the administration of morphin give evidence of rapid emptying of the common duct, the opaque medium is usually found in the duodenum. Roentgenograms of the same patients after the administration of morphin

give evidence of distention of the common duct. The opaque substance remains in the hepatic ducts and smaller branches of the biliary tree, and the lower end of the common duct tapers to a sharp point, suggesting muscular spasm. The picture is not unlike that of the esophagus in the presence of cardiospasm.

As muscle spasm appeared to be the main factor in the phenomenon described, drugs that might cause relaxation were tried to counteract the spasm caused by morphin and subsequently to relieve the pain. No depressor effect was produced on the morphin curve by atropin, histamin, phenobarbital sodium, alcohol, or acetylsalicylic acid. The administration of epinephrin in small doses was followed by a definite transitory decrease, but made the patient uncomfortable.

The drug that produced complete disappearance of pressure and absolute relief of pain was amyl nitrite. A few whiffs of this drug almost at once brought the pressure down to zero where it remained for a few minutes. It then slowly returned, after about fifteen minutes, to the level at which it had been after the administration of the morphin. When the pressure fell, the patient was completely relieved of pain.

Nitroglycerine was about a third as effective as amyl nitrite in depressing the curve which followed the administration of morphin. However, it seemed to cause relaxation of the spasm which produces the pain from which the patient ordinarily suffers.

Ligas, A. Experimental Researches on the Comparative Pressure in the Common Duct and the Gall Bladder During Emptying of the Gall Bladder by Puncture and Its Natural Refilling (Ricerche sperimentali sulla pressione comparata del coledoco e della cistifellea durante il vuotamento della cistifellea con puntura e il suo naturale riempimento). *Ann ital chir*, 1936, 15 231

In studies of the comparative pressure in the common duct and the gall bladder after having emptied the latter by puncturing it and allowing it to become refilled, Ligas was able to confirm observations previously made in his clinic which indicated that the natural pressure in the common duct is usually lower than the natural pressure in the gall bladder.

In the common duct the usual pressure ranges from 4 to 10 and the maximum pressure from 14 to 20 mm of water. In the gall bladder the corresponding pressures range from 15 to 30 and from 40 to 80 mm of water.

Ligas found also that, under physiological conditions, the pressure in the common duct and gall bladder and the quantity of bile present in the gall bladder in different animals undergo marked variations which are independent of the reciprocal influence of the common duct and gall bladder and of the organic and functional condition of the animal. Variations produced by artificial emptying of the gall bladder, however, show a distinct interdependence. The character of the action is entirely

functional. As the gall bladder refills spontaneously, the normal pressure relations become re established.

With regard to the behavior of the gall bladder after its emptying the author expresses the opinion that its pressure is re established as the result of its automatism because, after it is emptied its globular form is rapidly restored. Its pressure is evidently not related to the quantity of bile it contains, since at the end of the experiment the quantity of bile was less than at the beginning yet the pressure in the gall bladder was greater than the pressure in the common duct. Apparently, therefore, it was the passive refilling which accounted for the pressure in the gall bladder. RICHARD E. SOMMA, M D

Clute H M The Problem of Cancer of the Pancreas *J Am M Ass*, 1935, 107, 91

From a statistical study of cancer of the pancreas, Hoffman concluded that deaths from cancer of the pancreas constitute 3 per cent of all deaths due to cancer and that in the United States the annual number of deaths due to this condition is 4000.

The malignant process in the pancreas may originate in the parenchyma of the gland, the pancreatic ducts, or, rarely, in an island of Langerhans. The most common type of tumor is the adenocarcinoma, but sarcomatous neoplasms are not infrequent. Most pancreatic cancers are primary in the pancreas. A very few are primary in the biliary tract or duodenum. The tumor is located most frequently in the head of the gland.

Pancreatic cancer may metastasize by (1) direct extension into contiguous organs (2) growth through the lymphatics, or (3) invasion through the adjacent blood vessels. To the surgeon the rapidity with which it metastasizes is most important. Most pancreatic cancers form metastases within a few months after they are discovered.

Progress in the treatment of pancreatic cancer is dependent largely on early diagnosis before the lesion has become extensive and before metastases have occurred. The occurrence in a man at middle age of digestive disturbances, epigastric fullness and discomfort, pain and weight loss warrants a thorough study by all means available. If no other condition is revealed by examination and gastro-intestinal studies the possibility of pancreatic cancer must be considered at once. Auscultation of the abdomen, palpation for a deep tumor under anesthesia if necessary and repeated studies for an increase in the bilirubin content of the blood may yield sufficient further evidence to warrant exploration of the upper part of the abdomen. In many instances the available data will be too indecisive to permit a positive diagnosis but will nevertheless be sufficiently suggestive to warrant abdominal exploration. Duodenal tube drainage of the region of the ampulla will often show absence of bile and may reveal blood. Such changes are very suggestive of pancreatic cancer. In a few cases traces of sugar will be found in the urine but true diabetes in cancer of the pancreas is less common than has been

thought. Tests of the urine, stools and blood for evidences of faulty pancreatic function have not yet proved of practical value in the diagnosis of pancreatic cancer.

High voltage roentgen therapy appears to be the least valuable type of therapy for cancer of the pancreas. Very little clinical work has been reported on the use of radium in malignant disease of the pancreas, yet it would seem that this might be a logical approach to the treatment of the condition. Very possibly a 2 stage operation in which a biliary intestinal anastomosis is done in the first stage and radium is implanted in the second would be desirable. The stages should be separated by an interval of only 2 or 3 weeks. With this procedure the jaundice could be overcome by the first operation and on the basis of the location and size of the tumor definite plans could be made for the amount of radium to be used at the second operation.

It is now becoming more generally accepted that, in the cases of seriously jaundiced patients who apparently have a cancer of the pancreas, surgical exploration should be done to determine with as much certainty as possible whether the jaundice is due to cancer of the pancreas or to stones in the common duct or pancreatitis and whether anastomosis of the gall bladder or common duct to the stomach or intestine is indicated for its relief. It must be recognized, however, that in cancer of the pancreas simple exploration has a definite mortality, and that the average length of life after exploration is less than when no operative procedure is carried out. Biliary intestinal anastomoses have a high immediate mortality. This varies in different clinics doubtless because of a difference in the selection of the cases. It must be borne in mind also that patients with pancreatic cancer are prone to develop later difficulties from infections of the biliary tract from the anastomosis. However, these facts should not condemn the procedure. Tumors of the body or tail of the pancreas may be exposed through the gastrophrenic omentum, the gastrosplenic omentum, or the transverse mesocolon, but exposure through the transverse mesocolon is probably of little value.

JOSEPH K. SARAT, M D

## MISCELLANEOUS

Charbonnier A Auscultation in Acute Surgical Conditions of the Abdomen (*L auscultation dans les affections chirurgicales aiguës de l'abdomen*) *Les med de la Suisse Rom* 1935, p 513

For several years Charbonnier has been making a systematic examination with the stethoscope of all patients whether treated surgically or otherwise. After accumulating a great many observations he reports his conclusions regarding the value of this procedure. His article includes a bibliography referring chiefly to the French and Italian literature and résumés of a large number of case histories.

He points out that as auscultation of the abdomen has been practiced so imperfectly and so irregularly

up to the present time judgment of its value has been heretofore impossible. After his wide experience he believes that such auscultation is just as important as auscultation of the lungs and heart. It is a method that can be used at the bedside without inconvenience to the patient. Skill in the use of the stethoscope in abdominal diagnosis is easy to acquire. However, a thorough knowledge of the normal sounds in the abdomen is essential to distinguish sounds that are abnormal and to draw accurate conclusions as to their causation. The surgeon must be able to recognize modifications of the normal peristaltic rhythm (hyperperistalsis and hypoperistalsis), to distinguish the difference in rhythm and in timbre of the sounds characteristic of the stomach, the small intestine, and the colon, and to interpret the variations in tone and resonance produced by gaseous or hydrogaseous distention of the intestines.

Auscultation is of particular value in confirming the diagnosis of peritonitis, volvulus, and perforation. In cases of abdominal distention it may aid in the localization of an obstruction by making it possible to distinguish a solid from a cystic tumor or by revealing intraperitoneal fluid of an amount undetectable by routine physical examination. It also permits the surgeon to follow the evolution of an acute abdominal condition and to make a more definite prognosis. In the postoperative period it is of the greatest value in following the intraperitoneal reactions. Charbonnier emphasizes that under all of these circumstances it should be used only as a supplement to other diagnostic methods. For success it must be done systematically and sufficiently long at a time, and must be frequently repeated.

The sounds heard in the abdomen are divided into passive and active sounds. Among the former are peritoneal rubs due to the movement of the abdominal wall and the diaphragm in respiration. Under certain conditions other passive sounds may be produced by cardiac or aortic pulsation, but these are very rare.

The active sounds are produced by the automatic movements of the abdominal viscera. The most important is what Charbonnier calls the "peristaltic murmur." After reviewing the normal physiology of all portions of the intestinal tract, Charbonnier describes the variations of this normal sound. Free fluid produces a double bruit in quick succession like the sensation obtained on percussion. Encysted fluid transmits the peristaltic murmur and has a metallic resonance to light tapping.

Charbonnier urges that the following procedures be carried out in the cases of all patients:

- 1 Auscultation of the peristaltic murmur. Rhythm, exaggeration, diminution, or absence of the murmur, and the murmur produced in the small intestine, colon, stomach, and pylorus should be noted.

- 2 Auscultation to determine the tone and quality of the murmur and other sounds. The variation depends upon the degree of abdominal distention.

- 3 Auscultation for (a) passive sounds, e.g., peritoneal rubs and rubs produced by pressure of the hand, (b) intra abdominal adventitious sounds such as those produced by the escape of liquid through a perforation and by vascular thrills, and (c) extra abdominal sounds such as osseous crepitation and pleuropulmonary sounds.

Charbonnier describes the changes in the various murmurs described and the adventitious sounds that may be expected in the following surgical conditions of the abdomen: (1) intestinal obstruction and volvulus, (2) acute generalized and localized peritonitis, (3) accidental and spontaneous perforation of the intestinal tract, (4) inflammation of intraperitoneal and retroperitoneal viscera, (5) ileomesenteric infarction, and acute dilatation of the stomach.

MARSH W. POOLE, M.D.

Lynn, F. S., and Huff, H. C. The Elective Transverse Abdominal Incision. *Ann. Surg.*, 1936, 104: 233.

The authors believe that in selected cases of definite pathological conditions in the upper abdomen the transverse abdominal incision is ideal as it gives most satisfactory exposure and permits easy and secure closure. They state that the object of any abdominal incision is threefold: (1) adequate exposure, (2) secure and reliable closure, and (3) the prevention of hernia. They believe that the transverse incision meets all of these requirements better than incisions of other types. They contend that usually a vertical incision is converted into a transverse incision by lateral retraction, and that some times the force is so great that the structures of the abdominal wall are traumatized.

Attention is called to the fact that the transverse abdominal incision is an old one, it having been used first in 1847 by Baudelocque for cesarean section.

Anatomically, the incision is very good for the following reasons:

- 1 The cleavage of the skin is transverse to the long axis of the body.

- 2 The rectus sheath above the semilunar fold of Douglas is formed by aponeurosis of the external oblique and anterior and posterior lamellae of the internal oblique. The fibers of all of these structures course in a transverse direction.

- 3 The tendinous insertions run transversely to the recti muscles situated at the umbilicus, the lower border of the xiphoid, and midway between. The seventh, eighth, and ninth intercostal nerves run just below these landmarks. It is desirable to avoid cutting these structures because they act as a strong splint to the recti muscles. The main intercostal nerve and even its minute branches course in a transverse direction in the operative site. Therefore the incision does not sever any important nerves.

- 4 Because of the extensive anastomoses, severance of vessels by the transverse incision, which runs at right angles to them is not unfavorable.

In coughing, sneezing, and straining, the edges of the wound made by a vertical incision tend to be



pulled apart whereas those of the wound made by a transverse incision tend to be approximated

Sloan reports that there is thirty times more pull in a vertical closure than in a transverse closure. After operations performed with a vertical incision, inhibition of thoracic movement to splint the incision and thereby relieve pain favors atelectasis and pulmonary hypostasis.

The transverse incision is made through all of the structures from the abdominal wall to and including the peritoneum. The tendency toward evisceration is less in such an incision than in vertical incisions. In the closure of the transverse incision it is often helpful to 'jackknife' the table. The wound is closed in the usual manner, the peritoneum and posterior aponeurosis being sutured in one layer.

The transverse incision is of advantage to the patient because it reduces the amount of anesthetic

and gauze packing required and is followed by less wound reaction, shock, and pain and by fewer post-operative complications. It is of advantage to the surgeon because it is more anatomically correct than other incisions; it is physiologically correct; it gives excellent exposure and therefore reduces handling of the viscera to the minimum; the use of retractors is usually unnecessary; it permits easy, secure, and reliable closure; it is less apt than other incisions to be followed by fascial slough or hernia; it is followed by less pain than other incisions; it yields better end results in the presence of infection; and it is ideal in selected cases of definite disease.

Its disadvantages are that it cuts across the recti muscles; bleeding is a little more profuse than when other incisions are used; and it is not an ideal incision for all abdominal viscera.

FRANK STINCHFIELD M.D.

# GYNECOLOGY

## UTERUS

Laffont, A., Montpellier, J., and Laffargue, P.  
Metaplastic and Hyperplastic States of the  
Uterine Cervix Leukoplakia (États mé-  
tastiques et hyperplastiques du col utérin La  
leucoplasie) *Gynéc et obst.*, 1936, 34 5

Before the work of von Franque, Verdalle, and Hinselmann, leukoplakia of the cervix was considered a rare lesion and of little interest. This point of view is no longer tenable as it has been found fairly often when it has been looked for properly and is considered by many to be precancerous. In the opinion of the authors, the condition has frequently been confused with epithelial hyperplasia and simple metaplasia, particularly outside of France.

It is the purpose of this article to define, describe, and discuss the significance of these 3 lesions.

The authors believe that all pathologic variations in the cervical epithelium may be classified as epidermoid metaplasia or hyperplasia.

Of the first type is the reaction often seen in the cervix of old women—simple epidermization of the cervical epithelium without appreciable hyperplasia of the muciparous cells and without inflammation of the corium. This may be complete or incomplete, or a simple pseudo epidermization. The complete type is characterized by total epidermoid transformation of the epithelium with thinning of the epithelial lining and no hyperplasia. The incomplete type is a sort of "pre epidermization" in which the stratum granulosum is incomplete and keratinization is imperfect. It suggests arrest of development of the complete type at a premature stage. In the simple pseudo epidermization, epidermization is suggested only grossly. The superficial layers are flattened, and flattened acidophilic cells are seen.

These 3 conditions are all terminal or regressive states, and are believed not to have neoplastic potentialities.

Lesions of the hyperplastic type possess a more dynamic potential. The various pictures represent merely transient stages in their evolution. The following 3 types are recognized.

**True leukoplakia.** This is characterized by complete epidermization of mucous cells with the appearance of a stratum granulosum reproducing true epidermis, hyperacanthosis with the stroma penetrated by more or less irregular epithelial projections and an inflammatory reaction in the stroma.

**Pre leukoplakia.** This is characterized by incomplete keratinization, absence of a stratum granulosum, incomplete epidermization, hyperacanthosis, and superficial inflammation of the stroma. It is a sort of leukoplakia in the making.

**3 Pseudo leukoplakia.** This is characterized by irregular hyperacanthosis and stromal inflammation

surpassing that of ordinary cervicitis, absence of epidermization, superficial cells which are clear, empty looking and flattened, and form acidophilic lamellae which suggest keratinized layers.

The authors believe that true leukoplakia of the cervix, like true leukoplakia of the tongue, is precancerous, but they do not attempt to estimate the frequency with which it changes to cancer. Pre-leukoplakia and pseudo leukoplakia are regarded as possible menaces.

Simple epithelial hyperplasia consists of proliferation of only the squamous epithelium without change in the maturative cycle of the mucous cells. The squamous layer becomes thick and may send projections into the underlying stroma. The basement membrane remains intact. The condition probably originates in a response to inflammation. Though of little importance ordinarily, it is regarded as essentially precancerous.

Of all the changes described, hyperacanthosis is considered most specifically precancerous.

The opinions of others are cited. Hinselmann believes that leukoplakia presages cancer. Of 6 of his patients who had histologically verified leukoplakia in 1926, 4 developed cancer before 1930. Heidler, Genin, Franceschini, Aubry and Suquet, von Franque, von Snoo, Bergmann, and Martzloff agree with Hinselmann, but Mayer and Hemicksen are skeptical.

Leukoplakia is the only one of the lesions which is recognizable by the naked eye or on examination with the colposcope. The authors believe that the colposcope should be used more frequently and that in cases in which the findings are the least suspicious a biopsy specimen should be taken in order that a precancerous state may be recognized and eradicated.

The article is illustrated with photomicrographs.

DANIEL G. MORTO, M.D.

Norris C. G. Adenocarcinoma of the Cervix. A Study of 43 Cases. *Am J Cancer*, 1936, 27 633.

In 9,509 cases of cervical cancer reported in the literature the incidence of adenocarcinoma was 5.7 per cent. In the author's series of 508 cases of cervical cancer treated at the John G. Clark Clinic of the Hospital of the University of Pennsylvania in the period from 1900 to 1934, in all of which the diagnosis was verified by histologic examination and a definite record of parity was made, the incidence of adenocarcinoma was 8.45 per cent. The macroscopic appearance of adenocarcinoma of the cervix is similar to that of the more common epidermoid variety, although the site of origin may be suggestive in the early stages. While the histologic types of adenocarcinoma of the cervix are numerous, the neoplasms may be divided into 2 groups: (1) the highly differentiated form of carcinoma, often desig-

nated as "adenoma malignum," and (2) the more embryonal and undifferentiated adenocarcinoma. Overlapping types are not uncommon.

The study reported in this article was made in 43 cases. The histologic study was based chiefly upon biopsy specimens, which adds to the difficulty of reaching accurate conclusions. A considerable number of tumors apparently originating at the cervico uterine junction were observed, but because of doubt as to their origin were excluded from consideration.

Thirty four of the 43 women were married, 4 were single, and 4 were widows. The status of 1 with regard to marriage was not recorded. The average age was 47 years. Sixty five and one tenth per cent of the patients were between 40 and 59 years of age. The youngest were each 28 years old. The average duration of symptoms prior to treatment was 11.07 months. Macroscopically 27.01 per cent of the growths were ulcerative, 46.52 per cent papillary, 9.3 per cent nodular, and 4.65 per cent diffuse. The macroscopic appearance of 66.62 per cent is not stated with the exception of 4 patients who survived for 5 years, those with the ulcerative type of lesion survived for an average of 15 months after the initial treatment, those with the papillary type for an average of 20 months, those with the nodular type, for an average of 20 months, and those with the diffuse type for an average of 8 months. The location of the growth apparently was not an important factor in the average survival period.

According to the Schmitz classification, 34.9 per cent of the lesions were in Stage 1, 11.6 per cent in Stage 2, 27.9 per cent in Stage 3, 18.6 per cent in Stage 4, and 2.3 per cent in Stage 5 (recurrences) when treatment was instituted. The stage of 4.7 per cent is not known.

#### TREATMENT AND RESULTS IN 43 CASES OF ADENOCARCINOMA OF THE UTERUS

	Number	Per cent
Treatment by irradiation or surgery	41	95.35
Too advanced for irradiation or surgery	2	4.65
Patients treated 5 years ago	31	
Alive	4*	12.90*
Dead	27†	87.10†
Patients treated less than 5 years ago	12	
Alive	4	33.33
Dead	7	58.33
Untraced	1	8.34

\*One patient living 5 years. Alive 14 years. 1 living 6 years and 1 living 8 years. All treated by radium irradiation. Two were in Stage 1 and 2 in Stage 3 at the time of treatment.  
†In this group were 2 which were too advanced for either irradiation or surgical treatment.

Excluding 4 five year survivals the average tenure of life after initial treatment in relation to the stage of advancement in 39 of the 43 cases was: Stage 1, 36 months; Stage 2, 25 months; Stage 3, 12 months; Stage 4, 4 months, and Stage 5, 14 months.

Eleven specimens were unsatisfactory for classification. Of the remaining 32 cases, the neoplasm was an adenocarcinoma in 34.37 per cent, an adenoma malignum in 37.5 per cent, and a tumor of the intermediate type in 28.13 per cent. The average period of survival in relation to the histological type was: adenocarcinoma, 12 months; adenoma malignum, 22 months; and intermediate, 15 months.

Although it is inadvisable to draw conclusions from small groups, the embryonal (unripe) tumors appear to be fatal about twice as often as the ripe or adenoma malignum neoplasms. Other things being equal, the proportion of cells undergoing mitosis is a fairly accurate index of the degree of malignancy and radiosensitivity. Adenocarcinomas are more prone to develop in the cervical canal than epitheliomas. Adenocarcinomas situated in the canal and those of the diffuse type cause symptoms later and are therefore likely to be further advanced when first observed than those arising from the portio. The palpable findings are of far greater prognostic value than is the duration of symptoms. Adenocarcinomas as a group are not less sensitive to irradiation than epitheliomas of the same region. The article is illustrated with 13 photomicrographs.

Berkelev, Sir C. Radium and Cancer of the Neck of the Uterus. *Edinburgh M J*, 1936, 43, 105.

The author discusses the problems and results of irradiation treatment of cervical cancer on the basis of his experience at the London County Council Radium Center for Carcinoma of the Uterus. The total number of patients observed at that institution from the time of its establishment in 1928 up to 1934 was 647. One hundred and sixty eight were treated 5 or more years ago.

Berkeley first comments on the frequency of cancer as a cause of death. In England, in 1934, cancer was responsible for a mortality of 14.3 per cent among women, which is second only to that of heart disease. Of the deaths from cancer of the female genitalia, uterine cancer accounted for 69.7 per cent. The incidence of cure would be increased if women applied for treatment earlier in the disease. The causes of delay of treatment are fear, ignorance, and carelessness. In 600 cases the average time between the first symptom and treatment was 6 months. As a rule treatment is delayed because the patient is ignorant of the possible significance of the bleeding. Occasionally, however, the doctor is responsible. While some authorities believe that the value of instruction of the public regarding cancer by means of lectures, leaflets, and exhibitions is lessened by the fear it engenders in persons who do not have cancer, Berkeley is of the opinion that it is better to be nervous than dead. The remedy for delay of treatment due to the doctor lies in following the well recognized teaching: investigate by vaginal examination and if necessary by biopsy, all cases of intermenstrual and postmenopausal bleeding. While biopsy is the most valuable means of determining the

nature of the condition present, it should be done only when immediate treatment can be given if cancer is found, since, according to some authorities, it may spread cancer. Occasionally biopsy is unnecessary or is contraindicated by local or general conditions. In early cases Schiller's test may be of value. Of 550 cancers studied by biopsy, 88 per cent were of the squamous celled type and 12 per cent of the columnar celled type.

Of the patients whose cases are reviewed, the greatest number were between the ages of 51 and 60 years. Ninety five per cent were married. The average number of pregnancies was 5.4. The author believes that childbearing with resulting cervical lacerations and infection is one of the causes of cervical cancer.

For significant statistics an efficient follow-up is necessary. At the London County Council Radium Center for Carcinoma of the Uterus all except 7 patients have been followed.

The radium technic used is patterned after that of Radiumhemmet, the so called "Stockholm technic." For the last 2 years deep x ray therapy has been given in addition. A 220 kV machine is used. The entire pelvic cavity is irradiated through 8 fields, 2 anterior, 3 posterior, 2 lateral, and 1 perineal. One field a day is treated with a dose of 300 r. The total dose to the skin amounts to 9,000 r. The author discusses the theoretical advantages of x ray treatment. He believes that his results have been improved since the addition of x ray irradiation. The chief advantage of roentgen irradiation is its applicability to cancer extensions which cannot be reached with radium.

Among the complications of radium therapy are severe bleeding, general peritonitis, septicemia, embolism, and spasm of the bladder and rectum. The most common complication is fever due to absorption from the growth, pelvic cellulitis, urinary infection, or bronchopneumonia. Late complications are vaginitis, neuritis, pelvic cellulitis, radionecrosis, and fistulas. In 426 cases treated in the period from 1928 to 1933 there was only 1 death which could be attributed to radium irradiation. The author discusses the criteria of "radium death." Complications of x ray therapy are nausea and vomiting, increased susceptibility to infection, sepsis, and ulceration of the irradiated skin.

In discussing the difficulties encountered in grouping cases according to the 4 stages of advancement, Berkeley states that when in doubt, he always "up grades" the case, i.e., classifies it with cases at a stage in which the chance of cure is greater. Cases of all grades should be accepted and included in calculations. Even the most advanced cases may sometimes be benefited. As many institutions refuse cases which are hopeless, statistical comparisons of results obtained in different institutions may be untrustworthy. In the author's opinion the best figure for comparison is the absolute survival rate with no exclusions, as this compensates for most of the variables.

Of the 647 cases reviewed, 30.4 per cent were in Stage 1 or 2, and 69.6 per cent in Stage 3 or 4. In the 168 cases treated at least 5 years ago the absolute survival rate for 5 years according to stage were: Stage 1, 50 per cent, Stage 2, 19 per cent, Stage 3, 14 per cent, and Stage 4, 5 per cent. The incidence of 5 year survival in the total number of cases was 14.3 per cent. Berkeley attributes the poor results to the advanced stage of the disease in many of the cases, 35 per cent of which were in Stage 4.

DANIEL G. MORTON, M.D.

Heyman J. The Radiumhemmet Method of Treatment and Results of Cancer of the Corpus of the Uterus. *J. Obst. & Gynec. Brit. Emp.*, 1936, 43: 655.

The author comments on the difficulties encountered in making statistical reviews or comparisons of cases of cancer of the corpus of the uterus. The first difficulty is that of distinguishing between cancers of the corpus and other uterine cancers. There are cases in which adenocarcinoma can be demonstrated histologically in both the cervix and the corpus. How should such cases be classified? At Radiumhemmet they are listed under the special heading *carcinoma corporis et collis uteri*. The same question arises in cases in which cancer is found in both the corpus and the ovaries. At Radiumhemmet, such cases are listed under the heading *carcinoma corporis et ovarii*. A similar problem is presented by cases in which the pathologist finds it difficult to interpret the histological picture and, wishing to give the patient the benefit of the doubt, prefers to call the condition cancer rather than to run the risk of making a mistake. These cases are listed by Heyman as cases of *probable cancer*. Another difficulty is that of deciding which patients should be considered symptom free at the end of five years. Heyman regards as successfully treated "those who feel well, are able to work, and, if examined do not present any palpable changes due to cancer."

In his reports of results Heyman includes only cases of definite and probable cancer. At the Radiumhemmet 460 cases of corpus cancer were observed in the period from 1914 to 1935 inclusive. Of these, 232 came under observation at least five years ago. The absolute incidence of cure was 42.2 per cent and the relative incidence (8 patients were examined but not treated) was 43.7 per cent. The treatment was chiefly radiological but surgery was done if irradiation failed. If all patients subjected to operation are counted as having died of cancer on the day of operation, the incidence of five year cure following irradiation treatment alone was 33 per cent. Seventeen and four tenths per cent of the patients were inoperable when first seen. Of these, about 25 per cent were cured for five years. Of the patients who were operable, slightly more than half were only technically operable. The rest were unsuitable for surgery because of such factors as obesity and old age. In the clinically operable and the technically operable groups of cases the incidence

nated as "adenoma malignum," and (2) the more embryonal and undifferentiated adenocarcinoma. Overlapping types are not uncommon.

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conservatism, but must always be taken into account. There should never be any unnecessary sacrifice of tissue. The physician should not allow himself to be carried away by personal predilection for a particular procedure, but should cultivate a broad outlook regarding therapeutics and adapt his treatment to the requirements of the individual patient, choosing the method which offers the best functional result with the least risk and with the least sacrifice of tissue.

By considering the general value of the methods now available the author assesses the scope of conservative treatment in obstetrics and gynecology. He states that antenatal care will decrease maternal mortality and reduce the incidence of the morbidity which impairs or destroys the function of the puerperal uterus. As the consequence of neglect of prenatal care the art of obstetrics has declined and there has arisen a new race of obstetricians who regard labor as a surgical operation and cesarean section as the only means of dealing with its complications. The results of the low cesarean section, which has been performed with increasing frequency, have set up a reaction in favor of conservatism by demonstrating that a trial of labor is advisable before surgical delivery is considered.

Gynecological treatment became increasingly surgical in its technique and more radical in its method until a stage was reached in which expectant therapy was practically never employed. In recent years a reaction has set in and the futility of irrational and ablative operations founded upon erroneous views regarding the causation of pelvic disorders has become generally realized.

In dealing with uterine infection conservative treatment must continue to be palliative rather than curative. In mild cases, the symptoms may be relieved by such methods as the application of heat, diathermy, vaccines, and hydrotherapy. In the most inveterate cases, non operative methods are rarely successful and it is necessary to substitute radical for conservative procedures.

Benign tumors of the uterus may be treated by conservative methods when they may be excised without interfering with the structure and function of the uterus. When hysterectomy is performed for simple tumors and other lesions in which malignancy can be excluded there are obvious disadvantages in leaving an infected cervix *in situ*. The plan of abandoning the subtotal method entirely in favor of pan hysterectomy should not be pushed too far, particularly in regard to the risk of neoplasia of the cervix, since it has been shown that while the incidence of carcinoma is approximately 0.3 per cent, the additional risk involved by performance of the more extensive operation is about 2 per cent.

While in malignant disease of the uterus conservative treatment has played little, if any, part in the control or cure of the condition, the incidence of uterine carcinoma has been reduced by prenatal care and special attention to the repair of cervical injuries sustained during labor.

During the period since the war there has been an increase in the number of operations performed for prolapse of the uterus with a corresponding improvement in the functional results of such treatment. The same period has witnessed a marked diminution in the number of the operations which were formerly undertaken for the treatment of retroversion. Both of these changes must be regarded as conservative in the best sense of the term.

With regard to the use of hormones in gynecology, the author states that sufficient progress has already been made to warrant the hope that this therapy will soon replace radium and X ray irradiation in the treatment of many diseases, and will render certain surgical methods obsolete.

In conclusion Robinson says that, in spite of all the modern research, many pathological problems remain unsolved and empirical methods are still followed. It is obvious that much of our best treatment is empirical and that it must remain empirical as long as our knowledge of natural processes remains incomplete. HERBERT F. THURSTON, M.D.

# OBSTETRICS

## PREGNANCY AND ITS COMPLICATIONS

Voron J and Pigeaud H. The Pathogenesis of Pernicious Vomiting of Pregnancy (*l'athogénie des vomissements graves de la gestation*) *Gynec et obst* 1936 34 97

The authors are of the opinion that the diagnosis of pernicious vomiting of pregnancy is justified only when a pregnant woman who is free from disease of the stomach and central nervous system develops uncontrollable vomiting with rapidly increasing dehydration and acidosis and with symptoms of dis-equilibrium of the sympathetic nervous system. This opinion is based on their theory of the pathogenesis of pernicious vomiting of pregnancy which is as follows:

In normal pregnancy there is a state of equilibrium which differs markedly from that in the normal non pregnant state. During the transition from one state of equilibrium to the other a stage of disequilibrium is reached. The disequilibrium involves the endocrine and sympathetic nervous systems which are interdependent. The consequent dysfunction of these systems leads to vomiting which in turn results in rapid inanition as the consequence of the loss to the organism of essentials such as water, salt and sugar. The organism is then forced to live on its own reserve and develops metabolic derangements which result in the elaboration and liberation of toxic products. The consequent state of true auto-intoxication causes extensive tissue damage. This succession of events may be instituted by the primary failure of an endocrine gland or by impairment of the function of the sympathetic nervous system. All pregnant women are potential vomiters but only those with impairment of function of the endocrine or sympathetic nervous system become pernicious vomiters.

In the authors' opinion this theory satisfactorily explains the successful results of the present day treatment of pernicious vomiting of pregnancy.

HAROLD C WACK M.D.

Fruhlinsholz and Petroff. Retroplacental Hemorrhage: Facts, Statistics and Hypotheses (A propos de l'hémorragie rétroplacentaire. Des faits, des chiffres et quelques hypothèses) *Gynec et obst* 1936 33 497

Of 22,220 deliveries in the period from 1920 to 1934 (9,843 those of primiparas and 12,377 those of multiparas) retroplacental hemorrhage occurred in 49. In multiparas it was 3 times as frequent and in women who had borne numerous children it was almost 8 times as frequent as in primiparas. The authors believe that in older multiparous women a hereditary predisposition, particularly in the vascular system, is a factor in its occurrence.

Eclampsia is less frequent in multiparas than in primiparas but its incidence rises in older multiparas who have borne a large number of children. Frequently the 2 conditions are found together in the latter.

General care and regulation of the diet are more successful in preventing eclampsia than in preventing retroplacental hemorrhage. In the 48 cases of retroplacental hemorrhage reviewed there were 3 maternal deaths. The fetal mortality was 85.4 per cent about twice that in cases of eclampsia.

In the authors' cases of retroplacental hemorrhage the treatment has been strictly conservative and almost always obstetrical. In their opinion the results prove that such treatment is as good as exclusively surgical treatment.

MARSH W POOLE M.D.

## LABOR AND ITS COMPLICATIONS

Baffard M B. Spontaneous Rupture of the Membranes Before the Onset of Labor (*Am J Obst & Gynec* 1936 32 443)

In a series of 860 deliveries the incidence of premature rupture of the membranes was approximately 7 per cent. The author suggests that early rupture may be more frequent in white women than in colored women.

In the reviewed cases of primigravidas the average latent period was 13.17 hours and in those of multigravidas 21.41 hours. Apparently parity and age are not factors in the incidence of premature rupture of the membranes.

Following rupture of the membranes before the onset of labor the average duration of labor is less than that generally regarded as normal. In the reviewed cases the duration of labor in relation to the number of pregnancies remained almost constant except in the ninth, tenth, thirteenth and fifteenth pregnancies in which it was approximately doubled and in the sixteenth and twenty first pregnancies in which it was only one half as long.

There is no relation of the baby's weight to the duration of labor that can be demonstrated to be due to premature rupture of the membranes. In cases of abnormal presentation there is no lengthening of the latent period or of the duration of labor. The size of the baby has no relation to the latent period or the duration of labor. In the reviewed cases the incidence of operative delivery was not increased.

Rupture of the membranes before the onset of labor seems to be favored by toxemias, syphilis and twin pregnancy. Abnormal presentations may also be a factor in its causation.

Complications are rare. The most common is infection. In the reviewed cases the corrected ma-

ternal morbidity was 0.025 per cent and the corrected maternal mortality was zero. Of the babies, 91.56 per cent were born alive at full term. The deaths of only 2 babies can be attributed to the early rupture of the membranes.

EDWARD L. CORNELL, M D

Fontes, J. The Exciting Cause of Labor (*Sobre o determinismo do parto*). *Arq de patol*, 1930, 7: 283.

The author presents a critical review of the various theories as to the exciting cause of labor—the follicular theory, the corpus luteum theory, the hypophyseal theory, and others.

He then reports the results of his own research which have led him to the conclusion that labor is brought on both by an action exercised by the fetus and a special condition of the musculature and nerves of the uterus at term.

He states that the distention caused by the fetus has a stimulating action on uterine contractions similar to that of blood on the heart. This stimulating action was demonstrated in an experiment on a guinea pig in which pieces of ebonite were introduced into a uterine horn. However, distention of the uterus alone is not sufficient to explain the occurrence of labor, there must be also some specific stimulus.

In the blood of women in labor Fontes found a substance which has an oxytocic action on the uterus of the guinea pig, causing rhythmical and energetic contractions for hours. The horn of the uterus of the same animal which was not treated with this substance showed no contractions at all or only much slighter contractions without rhythm.

The 2 cornua of the uterus were placed in oxygenated Ringer's solution and then heated to 38 degrees C in separate vessels. To one vessel 1 or 2 c cm of defibrinated blood from a woman in labor, and to the other the same amount of the blood from a puerperal woman or a man were added. The blood of the woman in labor caused contractions which were very different from those produced by the other blood. The author shows the nature of these contractions by tracings.

In the belief that the oxytocic property may be present in the placenta, Fontes tested placental extracts on the uteri of guinea pigs. The extracts were found to have a decidedly oxytocic action. When they were employed in experiments on pregnant guinea pigs they caused abortion.

AUDREY GOSS MORGAN, M D

Kreis, J. The Results of "Medical Accouchement" in Cases of Difficult Dilatation (*Le rendement de l'accouchement médical dans les cas à dilatation difficile*). *Gynec et obst*, 1936, 34: 24.

Kreis reports nine obstetrical cases in which injections of an antispasmodic drug—spasmalgine—were given when dilatation did not proceed normally. The uterine contractions were studied by the author's method of hysterography, and the degree of dilatation was determined by vaginal examina-

tion. The uterine contractions were abnormal, being diminished in amplitude and irregular, dilatation did not proceed with normal speed, and there were often signs of fetal distress.

The spasmalgine was administered in doses of ½ c cm as soon as the abnormality of the contractions and the delay in dilatation became apparent. From nine to twenty injections were given in from six to twelve hours. By this treatment the contractions were rendered normal and regular and the duration of labor was shortened. In no case was instrumentation necessary. The infants were normal, the placenta was normally delivered, and the puerperium was uncomplicated. In no case did the spasmalgine have an unfavorable effect on either the mother or the child.

The author considers an antispasmodic such as spasmalgine superior to postpartum preparations for the regulation of abnormal uterine contractions and the promotion of rapid dilatation as postpartum preparations may cause tetanic contractions.

ALICE M MEYERS

Beruti, J. A., and Leon, J. Broadening of the Indications for Symphyseotomy (*Ampliación de las indicaciones de la sinfisiotomía*). *Bol Soc de obst y ginec de Buenos Aires*, 1936, 15: 146.

The authors discuss the relative indications for symphyseotomy, which they consider one of the most complex problems in obstetrics and a problem still far from solution. They believe that the operation should be performed only when the probabilities are that labor will be terminated spontaneously. Absolute dystocia and disturbances of uterine dynamics are definite contra indications. However, in cases of moderate pelvic contraction in which failure of the test of labor forces a choice between cesarean section and symphyseotomy, the latter is justifiable. They are opposed to the systematic practice of extraction procedures before a trial of "semi prophylactic" symphyseotomy if the contractions are good. In infection of the amniotic fluid, symphyseotomy is preferable to late cesarean section because deaths following the former are rare and most of the injuries are repairable.

In brow presentations, symphyseotomy has a considerable field of application since this position causes an "accidental" disproportion even when the pelvis is normal. Argentine obstetricians are inclined to regard brow presentation as an absolute indication for the operation.

The authors report three cases of brow presentation in primiparas with moderately contracted pelvis in which symphyseotomy was done. The duration of labor before the symphyseotomy varied from forty to sixty hours. Two of the labors terminated spontaneously and one was terminated with forceps. All of the infants were born alive. All of the mothers had a febrile puerperium, but were discharged in good condition. Recent examinations show that none of them had sequelae from the operation.

M E MORSE, M D



Montgomery T L. *The Immediate and the Remote Effect of Abdominal Cesarean Section*. *Am J Obst & Gynec*, 1936, 31: 968

Of 13 733 deliveries on a charity service in the period from 1925 to 1935 abdominal cesarean section was done in 229 (16 per cent). Of the 229 patients operated upon 57 (25 per cent) were previously unregistered and received no prenatal care and 98 (43 per cent) were colored. There were 14 deaths a mortality of 6.1 per cent. Five of the deaths were due to septic infection and 4 sudden deaths on the operating table to shock and hemorrhage in cases of far advanced placenta previa. Antenatal hemorrhage played an even more important rôle in the mortality than is indicated by these figures since of the 2 patients who died of postoperative pneumonia, 1 had central placenta previa and the other premature separation of the placenta. Placenta previa and premature separation of the placenta were factors in 42 per cent of the deaths.

One hundred and forty eight (64.6 per cent) of the 229 operations were followed by puerperal morbidity. In 31 cases the morbidity was due to infection of the abdominal incision. Tenderness of the uterus and disturbance of the lochial discharge occurred in 21 cases. Bronchial and pulmonary inflammation in 14. Infection of the urinary tract in 5. Widespread septic infection in 5 (all fatal), parametritis in 4 and femoral and broad ligament phlebitis in 4.

In the cases in which the classical operation was done the mortality was 5.5 per cent and the morbidity 65 per cent whereas in those in which the low cesarean section was done the mortality was 3.1 per cent and the morbidity 68 per cent.

The elective classical operation in 110 cases and the classical operation in 15 cases performed before twelve hours of labor had a combined mortality of 0.82 per cent. When they were performed after twelve hours of labor the classical section had a mortality of 8 per cent and the low section a mortality of 3.5 per cent.

The membranes were ruptured prematurely in 16 cases. In 14 (87.5 per cent) of these puerperal morbidity developed. In 1 case death resulted.

Sixty of the patients came under observation during pregnancy after 1 or more cesarean sections. One aborted and 1 who was observed in early pregnancy was lost sight of. Of the remainder 8 were delivered spontaneously, 4 with forceps, and 46 by abdominal section. In 3, rupture of the uterus occurred at the site of a classical uterine incision. In 7 patients the uterine scar of the previous operation was found at the time of subsequent operation to be decidedly weak.

Peritoneal adhesions were encountered almost always in repeated cesarean sections. In 17 of the 46 cases of abdominal delivery following a previous cesarean section they were particularly dense. Umbilical and incisional hernias are more common after cesarean section than after other types of low abdominal operations. EDWARD I. CORNFEL, M.D.

## NEWBORN

Randall L M., and Rynearson E H. *Delivery and Care of the Newborn Infant of the Diabetic Mother*. *J Am M Ass*, 1936, 107: 919

The authors have instituted the following general plan for the management of the infant of the diabetic mother for the first few days of its life. The length of time that the program must be maintained will vary according to the degree of prematurity, the length of time before food and fluid can be taken by mouth and the duration of the period of readjustment of pancreatic function.

The concentration of sugar in the blood of the mother, the infant and the umbilical cord is estimated immediately. If possible separate samples of blood are obtained from the umbilical artery and vein. Care is taken to free the pharynx and trachea of mucus and amniotic fluid. This is usually accomplished best by maintaining the head in a dependent position but sometimes it is necessary to aspirate with a tracheal catheter. Occasionally in halation of carbon dioxide and oxygen is necessary to establish respiration. When respiration has started the infant is placed in a Hess incubator equipped with a cover and connected with an oxygen tank. The flow of oxygen is regulated to maintain an oxygen tension of from 40 to 50 per cent for the first few hours. The temperature of the incubator is maintained at 85 degrees F. Five cubic centimeters of a 10 per cent solution of dextrose are administered into each buttock, and thereafter injections of 10 c cm. of this solution are given at intervals depending upon the content of sugar in the blood as determined by the micromethod. The behavior of the infant and the ability of the infant to take feedings by mouth.

Feeding is attempted within 4 hours. Ten cubic centimeters of a 20 per cent solution of dextrose or 7 c cm. of Marmott's lactic acid karo mixture are given every 2 hours for the first 48 hours if it can be tolerated. Then 30 c cm. of lactic acid karo mixture are given every 3 hours. Sufficient nursing assistance is secured for uninterrupted observation of the infant for the first 48 to 72 hours. Whenever the feeding is poorly taken or twitchings, convulsive movements or cyanosis indicate the development of hypoglycemia, 10 c cm. of a 10 per cent solution of dextrose are given by mouth if possible, but otherwise by intramuscular injection.

The length of the period of danger from the complications of hypoglycemia cannot be predicted with accuracy. The oxygen in the incubator is gradually diminished and when the infant maintains normal color in the ordinary atmosphere, the administration of oxygen is discontinued.

## MISCELLANEOUS

Davis M E., and Brunschwig A. *The Roentgenotherapy of Chorionepithelioma*. *Am J Obst & Gynec*, 1936, 31: 987

The authors report the case of a woman twenty six years old who in July 1931, had a spontaneous

abortion in the third month of pregnancy. The abortion was followed by dilatation and curettage for bleeding. The patient's last normal menstrual period before she was seen by the authors occurred in December, 1933. During the first week in January, 1934, she had a rather sudden and profuse vaginal hemorrhage. Bleeding occurred again on January 18, but she considered this a normal menstruation. About April 15 the bleeding began again and thereafter recurred intermittently. The patient used two or three pads daily. Occasionally a sudden profuse gush of bright red blood occurred, particularly when she was unusually active. In the latter part of June the bleeding became more profuse, rhythmic contractions in the lower abdomen resembling labor contractions, began, and the temperature rose to 104 degrees F.

When the authors saw the woman for the first time she had been in labor for several days. On vaginal examination the cervix was found completely dilated and effaced, and a soft, spongy, friable mass was discovered filling the os. Further examination to determine the extent and character of the mass resulted in profuse bleeding. Following rupture of the membranes a live fetus of approximately six months was delivered. The skin of the fetus was macerated and peeled off in large fragments.

The placenta, which was normal, was high in the fundus and was removed with ease. The soft, friable, boggy mass was found to occupy the entire lower segment of the uterus and to be intimately connected to it. The uterus and vagina were thoroughly packed.

When the pack was removed on the following day the bleeding recurred and persisted in spite of a second attempt at vaginal tamponade. The patient continued to run a septic course. As her condition rapidly deteriorated because of the continued bleeding, laparotomy was performed after two liberal blood transfusions.

At operation, the uterus was found to be several times the normal size and in a typical puerperal state. Such extensive induration was present in the region of both broad ligaments that the entire cervix

and uterus appeared to be fixed. A mass could be felt in the right broad ligament. The corpus was removed supravaginally along with the adnexa. In the cutting of the right broad ligament and the cervix, tumor tissue could be seen infiltrating the structures throughout. Because of the extent of the growth, removal of the cervix was impossible. The bleeding was controlled and the stump peritonized.

After the operation the patient had a stormy course for a week or so and then showed daily improvement. Irradiation was begun twelve days after the operation and continued with only slight interruptions for thirty seven days. X-ray examination of the lungs and bones disclosed no metastases. When the patient was last seen, on November 1, 1935, she appeared to be in excellent health.

The authors state that, so far as they are aware, this is the first case of chorionepithelioma in the presence of a normal pregnancy with a living baby to be reported. They believe it not unlikely that the new growth developed simultaneously with the growth of the fetus.

The factors in the roentgen treatment in this case were voltage, 200,000, 3 ma, filtration with 1.5 mm of copper and 2 mm of aluminum, a focus skin distance of 50 cm., 4 pelvic portals measuring 15 by 15 cm. through each of which the beam was directed to converge on the site of the uterus and the upper part of the vagina, and a perineal portal of the same size through which the beam was directed upward into the pelvis. One treatment a day per portal was given. The dose was 242 r measured in air. The pelvic portals were treated in rotation until each portal had received a total of eight treatments. The series was then completed by three treatments of 212 r each to the pelvic portal. The period of irradiation was thirty seven days, the total dose measured in air, 8,712 r, the skin dose (backscatter factor, 0.3), 11,225 r, and the estimated tumor dose (30 per cent at 10 cm.), 3,740 r.

The results of this treatment were so successful that the authors believe irradiation therapy should be considered in every case of chorionepithelioma.

EDWARD L. CORWELL, M.D.

# GENITO-URINARY SURGERY

## ADRENAL, KIDNEY, AND URETER

Graham, G., Simpson, S. L., Allott, E. N. Discussion on the Treatment of Addison's Disease with Salt. *Proc Roy Soc Med Lond*, 1936, 29, 1137

GRAHAM called attention to the fact that the cortex of the adrenal is necessary to life whereas the medulla may be destroyed without causing any appreciable disturbance. In experiments on dogs in which both adrenals were removed it was found possible to keep the animals alive for over 2 years by the administration of cortical extract. The average survival of control dogs not receiving cortical extract was 8.6 days. Swingle's experiments have shown that the clinical condition in such dogs is closely although not exactly akin to surgical shock. In 3 cases of Addison's disease, Loeb found an increase in the potassium ions and a decrease in the sodium and chlorine ions in the blood. His observations formed the basis of the salt treatment of Addison's disease. The effective level of sodium and chlorine ions can be maintained by the administration of salt solution or the use of cortical extract.

The reason for failure of sodium chloride therapy may be that the adrenal cortex controls something else besides the sodium ions in the blood; that an acute infection causes rapid death; or that the sodium ions are not supplied in the best way.

SHARNOFF stated that the use of cortical extract in Addison's disease has serious disadvantages, namely, high cost, the necessity of injecting the extract, and the necessity for large amounts. From an analysis of 6 cases he drew the following conclusions:

1. Salt given by mouth may be of value in all phases of Addison's disease.
2. Salt may be of slight or of no apparent benefit.
3. The emetic action of salt may prevent the oral administration of sufficient amounts since at least 10 gm. are needed daily.
4. Cortical extract given in adequate dosage by itself or in addition to salt produces a much better clinical response than salt alone.
5. When the dose of cortical extract is sufficient, the addition of salt is of no benefit, but when the dose of extract is inadequate, the addition of salt may be of appreciable benefit.
6. When the patient goes into a crisis in spite of treatment with large doses of salt, the administration of cortical extract may result in recovery.
7. Signs and symptoms of adrenal insufficiency may develop even when the serum values of sodium, chlorine, and potassium appear to be within the normal limits.

ALLOTT reported 5 cases of Addison's disease which were treated with salt. He expressed the

opinion that in cases treated with salt alone the ultimate prognosis is poor.

ANDREW McNALLY, M.D.

Sharnoff, J. and Sala, A. M. Vaginal Metastases from Hypernephroma. A Report of 4 Cases. *Am J Cancer*, 1936, 28, 20.

In the authors' 4 cases of hypernephroma with vaginal metastases, the vaginal nodule was on the anterior vaginal wall, very close to the external urethral orifice. In the majority of 16 similar cases collected from the literature, its site was the same. The authors believe that the formation of vaginal nodules is most easily explained on the basis of implantation by way of the urinary tract.

THEOPHIL P. GRAVER, M.D.

Anson, B. J., Richardson, G. A., and Minear, W. L. Variations in the Number and Arrangement of the Renal Vessels. *J Urol*, 1936, 36, 211.

The authors report the findings of a study of the renal vessels and their abnormalities in 200 cadavers. In only 35 per cent of the bodies were the renal arteries of both sides arranged so that a single vessel supplied each kidney. In 28 per cent, multiple arteries were found on both sides. The incidence of unilateral multiple arteries was about the same on the right and left sides.

Renal veins were found to be more uniformly single, 1 from each kidney. Accessory renal veins were present in only 21 per cent of the bodies.

The authors conclude that accessory renal arteries are so common that they should not be regarded as abnormalities.

THEOPHIL P. GRAVER, M.D.

Rogers, J. W. The Diagnosis of Spontaneous Rupture of the Kidney Pelvis by Means of Intravenous Urography. *J Urol*, 1936, 36, 104.

In all reported cases of spontaneous rupture of the kidney pelvis, the rupture occurred in a kidney damaged by calculi or infection. The author believes that if intravenous urography were carried out in all doubtful cases in which an uncomplicated perinephric abscess is suggested, the condition would be found in many to be a spontaneous rupture of the renal pelvis.

He reports a case in which the diagnosis of spontaneous rupture of the kidney pelvis was made by intravenous urography before cystoscopic or surgical intervention.

ANDREW McNALLY, M.D.

Hyman, A. Acute Suppurative Thrombophlebitis of the Renal Vein. *J Urol*, 1936, 36, 196.

This discussion is based on 6 cases in which the diagnosis of acute suppurative thrombophlebitis of the renal vein was confirmed by operation and post-

mortem examination This condition is nearly always secondary to a suppurative lesion in the kidney. In 5 of the 6 cases reviewed it was due to a cortical abscess of the kidney. The clinical picture is that of severe sepsis with signs of renal suppuration. Blood cultures may be positive.

If the sepsis persists after drainage and decapsulation of the kidney, nephrectomy is indicated. The vein should be ligated as close to the vena cava as possible.

The mortality of acute suppurative thrombophlebitis of the renal vein is high because in most cases the sepsis is widespread before the nature of the condition is recognized. THEOPHIL P. GRAUER, M.D.

Kretschmer, H. L., and Hibbs, W. G. Actinomycosis of the Kidney in Infancy and Childhood. *J. Urol.*, 1936, 36, 123.

Actinomycosis in children is rare. Of 670 persons with actinomycosis, only 45 were children. Actinomycosis of the kidney is exceedingly rare. The authors were able to find only 3 cases in the literature. To these they add a case coming under their own observation.

The infection occurs more frequently in males than in females. The organism, actinomycetes bovis, has been found in the mouth secretions and the gastro-intestinal tract of man and animals.

Renal actinomycosis may be primary or secondary. The primary lesion may be self limited or unrecognizable.

In the case reported by the authors the outstanding symptoms were fever, abdominal pain, lassitude, and loss of weight. The physical findings were a chronically draining sinus and enlargement of the left kidney.

The diagnosis is difficult, the condition being easily confused with tumor and tuberculosis.

In unilateral renal involvement the treatment of choice is nephrectomy. Drug therapy is unsatisfactory, as is evidenced by the numerous remedies suggested. ANDREW McNALLY, M.D.

Astraldu, A., and Uriburu, J. V. The Roentgenological Diagnosis of Serous Cysts of the Kidney (Radiodiagnóstico de los quistes serosos del riñón). *Rev. argen. de urol.*, 1936, 5, 85.

On the basis of 4 cases and the literature, the authors have come to the conclusion that under "perfect conditions" (including apparatus, technique, and preparation of the patient) serous cysts of the kidney can be diagnosed by simple roentgenography. The cysts are manifested by rounded shadows connected with the outline of the kidney. The authors comment on the striking and unexplained fact that it is very exceptional to find a notch in the kidney contour corresponding to the loss of renal substance produced by a cyst. The usual picture is a complete renal outline plus the shadow of the cyst.

In many cases the combination of ascending pyelography with roentgenography of the kidney helps to demonstrate the relation of the cyst to the calyces

and pelvis and the renal origin of the cyst. Descending pyelography brings out more clearly the contrast between the kidney and cyst. Perirenal emphysema has advantages, but has rarely been used because of ignorance of the method, difficulty in pre-operative diagnosis, or the fear of complications. In the one case in which the authors employed it, it permitted a better definition of the kidney and cysts.

The article is accompanied by photographs, roentgenograms, and a bibliography.

M. E. MORSE, M.D.

Lazarus, J. A. Cystic Dilatation of the Lower End of the Ureter. Special Reference to Transurethral Treatment with the High-Frequency Cutting Current. *J. Urol.*, 1936, 36, 139.

Cystic dilatation of the lower end of the ureter, ureteroceles, has been described under a variety of names. It is formed by an outer layer of bladder mucosa and an inner layer of ureteral mucosa. It is not to be confused with prolapse, which is an extrusion of ureteral mucosa.

According to the theory most widely accepted, it is due to congenital stenosis of the ureteral meatus. It occurs most frequently in supernumerary ureters. Ureteral stasis is present and may cause pyelectasis with complete destruction of the kidney.

Except in the rare cases in which the cyst fills the bladder completely, the diagnosis is made by cystoscopy.

In the author's cases transvesical resection is reserved for the very large cysts. Transurethral opening of the cyst with the cutting current has proved satisfactory. Nephrectomy is performed only when there is complete destruction of the kidney.

ANDREW McNALLY, M.D.

## BLADDER, URETHRA, AND PENIS

Paggi, B. Osteogenesis from Vesical Epithelium (Osteogenesi da epitelio vescicale). *Policlin.*, Rome, 1936, 43, sez. chir. 328.

Paggi states that, from the clinical and experimental points of view, osteogenesis from vesical epithelium is to be classified with heterotopic osteogenesis. From a practical point of view it is of only relative importance because it is very rare. From the scientific point of view it is of considerable importance because it offers an insight into the factors which favor osteogenesis in general.

After reviewing the literature on heterotopic ossification in general, Paggi reports the results of a series of experiments on 6 rabbits and 5 dogs in which he excised a portion of the bladder wall measuring about 5 by 20 mm. and grafted it into a breach made in the fibula by resection. In 2 of the rabbits cysts lined with vesical epithelium were formed at the site of the graft. In 1 of these animals it was possible to follow the formation of the cysts stage by stage. The cysts seemed to originate from degeneration of the central portions of certain

cellular nests of vesical epithelium. In the cases of both rabbits the walls of the cysts contained newly formed bone adjacent to the lining epithelium. In 1 of the animals the osseous neoformation appeared to be related to other newly formed bone evidently originating from the periosteum of the stump. In the other no connection between the newly formed bone adjacent to the cysts and the periosteum could be demonstrated. The bone formation from the periosteum stopped at a considerable distance from the ossification centers adjacent to the cystic cavity.

In the experiments on dogs replacement of the lost bone could be demonstrated roentgenologically in only 1 animal. In the latter radio opaque hands located exclusively at the sides of the graft were observed in the space between the stumps, and histological examination showed osseous neoformations in relation to the wall of a cyst lined with vesical epithelium which did not originate from the periosteum of the stumps.

Paggi concludes that homologous bladder wall transplants often give rise to the formation of cysts lined by vesical epithelium and that in the walls of these cysts immediately under the lining epithelium bone may be formed by a metaplastic or enchondral process.

RICHARD E. SOXMA, M.D.

**Dominici M. P.** Angiomas of the Urethra (Angiomes de l'urètre) *J. urol. méd. et chir.* 1936 42 34

Cavernous angioma of the urethra is very rare. The author reviews in detail 18 cases collected from the literature, reports a case observed at the Urological Clinic of Marion and cites a case reported by Young. Twelve of the patients were males.

Cavernous angiomas of the urethra tend to bleed spontaneously at intervals, usually drop by drop. Pain is rare but sometimes there is a tingling sensation in the perineum or urethra. Occasionally there is difficulty in urination. When the hemorrhage is severe it may cause anemia, lassitude, and loss of weight.

Treatment by the injection of hemostatics usually fails to cure the condition permanently. Several urologists have reported favorable results from repeated application of the galvanocautery electrolysis and electrocoagulation. Others have excised the tumor mass. Tuffier reported complete cure from radium irradiation. In the case reported by Dominici that of a man 24 years of age 2 applications of radium separated by a 3 month interval were made.

The article is followed by an extensive bibliography.

MARSH W. POOL, M.D.

## GENITAL ORGANS

**Scalfi A.** Benign Tumors of the Epididymis (Sui tumori benigni dell'epididimo) *Ann. ital. di chir.* 1936, 15 61

Benign tumors of the epididymis are of interest because of the usual resistance of the epididymis to

the formation of primary tumors and to invasion by malignant tumors. The author reports a case of benign tumor of the epididymis in a man fifty two years old. The patient gave a negative past history and denied venereal infection. Over a period of six years he had noticed the gradual and progressive development of a swelling of the right half of the scrotum. The only subjective symptom was a slight sense of heaviness in the scrotum. Fifteen days before the patient was examined by the author he noticed the onset of swelling of the left half of the scrotum.

Physical examination revealed enlargement and deformity of the scrotum. The right half was larger than the left half. Both sides were transparent to light and had other characteristics of hydrocele. On the left side besides the hydrocele a small nodule could be felt at the lower pole of the epididymis. The nodule was the size of a nut, discrete, smooth, and bony hard.

At operation for the bilateral hydrocele the nodule was excised. It was bony hard and cut with great resistance. The surfaces made by sectioning showed several zones of different tissue. The outer zone was soft and in places somewhat lamellated. The central zones were harder and in one region presented tissue which resembled bone of the spongy variety. An histological examination showed the tumor to consist of a mixture of tissues including hyaline cartilage, bone, epithelial tissue of the stratified squamous variety and connective tissue. A diagnosis of teratoma was made.

In a review of the literature the author was able to find reports of only fifty eight tumors of the epididymis. Eighteen of the neoplasms were benign and forty were malignant. Most of the subjects were between the ages of thirty and fifty years.

In the differential diagnosis of benign tumor of the epididymis it is necessary to rule out such conditions as spermatic cysts, tuberculosis, syphilis, chronic inflammation and primary and metastatic malignant tumors.

In cases of benign tumor the prognosis is good after excision of the neoplasm.

The author presents the following classification of primary tumors of the epididymis.

### Histioid tumors

Lipithelial tumors carcinoma

Connective tissue tumors fibroma, lipoma angioma sarcoma endothelioma

Muscular tumors leiomyoma

### Heterotopic tumors

Embryonal or fetal tumors

Cystic embryoma or teratoma

Cystosolid embryoma or teratoma

### Typical

Apparently simple chondrosarcoma, osteoma

True heterotopic tumors those arising from germinal cells of the preblast included in the wolffian body, those arising from rests of the wolffian body.

A. LOUIS ROSE, M.D.

## MISCELLANEOUS

Nicolas, J. Nicolas-Favre Disease, Poradenitis or Benign Suppurative Parilymphadenitis, Subacute Inguinal Lymphogranulomatosis of Venereal Origin (Maladie de Nicolas Favre, poradenite ou poradenolymphite suppurée benignique, lymphogranulomatose inguinale subaigue d'origine genitale et venéenne) *Bruxelles méd.*, 1936, 16 1510

The condition discussed in this article was first described in 1913 by Nicolas, Favre, and Durand who considered it a fourth venereal disease. Since that time it has been reported by others under a variety of names.

The disease is transmitted as a rule by sexual intercourse and is caused by a filterable virus. The primary lesion is described as a micro chancre which is followed by inguinal and iliac adenopathy. The inguinal glands suppurate and become fistulous. It has been shown that, while the disease occurs in all geographical areas, it is most frequent in warm regions and particularly in sea ports, and is identical with the so called "climatic" bubo which is so common in hot countries. At times it assumes an epidemic character.

It occurs most often in men in the period of sexual activity. In older persons and children it is rare. In women it is less frequent and causes suppuration of the inguinal glands less often than in men. Women are likely to present the anorectalgenital, syndrome of Jersild characterized by a progressive inflammatory reaction in the tissues and lymphatics of the vulva, vagina, perineum, rectum, and anus, with or without abscess and fistula formation.

The incubation period usually varies from 10 to 30 days, but following the experimental inoculation of a man by Levaditi, Lepine, and Marie it was 35 days.

While the usual initial lesion is the micro chancre, the disease is sometimes initiated by urethritis, balanitis, or vulvitis. The adenitis in the groin is characterized by slight discomfort which is aggravated by walking or fatigue, but is rarely sufficient to confine the patient to bed. The temperature seldom rises above 39 degrees C., but the patient may suffer from chills. In from 15 to 20 days the mass in the groin becomes hard and infiltrated. The indurated area is firmly attached to the skin, but may be moved fairly freely on the deep structures. After a few days it points, and spontaneous opening may leave a fistula which remains open for a long time. New abscesses and fistulae continue to form, and as the induration increases the evolution of the disease is very slow.

Differentiation of the disease from other types of inguinal adenopathy is aided by the involvement of the iliac glands and by the intradermal test of Frei. The intradermal test of Frei is of special value in the diagnosis of the anorectogenital type. It was not until the discovery of Frei's reaction in 1925 and the intracerebral inoculation of the monkey by Hellerstrom and Wassén that the nature of the

condition was understood. In 1931 the first human inoculation was carried out by injecting the virus subcutaneously into the prepuce of a man suffering from general paralysis. The characteristic adenitis began to appear 35 days later.

In the glandular type the prognosis is good although convalescence is slow. In the anorectogenital type it is unfavorable because of the possibility of pelvic involvement and elephantiasis.

The author discusses treatment by chemical agents given by mouth or injection, treatment by vaccines and antigens, and local treatment by injections into the glands, surgery, and roentgen irradiation. He has obtained the best results from intramuscular injections of a 6 per cent solution of antimoniothiomalate of lithium given in doses of 1, 2, or 3 c. cm. depending upon the patient's tolerance, supplemented by local treatment. The injections are given 3 times a week, 20 being given per series. Nicolas has found that the use of antimony and potassium tartrate solution recommended by Destefano and Vacarezza also gives good results, but is much more dangerous. Of the local measures advocated, he recommends injections of sterile glycerin, partial excision (total removal of the area often leads to elephantiasis), partial electrocoagulation, and irradiation therapy according to the technic of Coste. MAPSH W. POOLE, M.D.

Angerer, H. Urinary Calculus Disease. Observations and Experiences at the Surgical Clinic of the University of Leipzig (Die Harnsteinkrankheit. Nach den Beobachtungen und Erfahrungen der Chirurgischen Universitätsklinik Leipzig) *Arch. f. klin. Chir.*, 1936, 184 558

The author reviews 719 cases of urinary calculi which were treated at Payr's clinic in the 10 year period from January 1, 1925, to January 1, 1935. The ratio of men to women was 7:3. Ureteral stones were found with particular frequency in men between the ages of 20 and 35 years, while bladder stones were the chief urinary concretions in the aged. Nineteen of the 42 patients with bladder stones were in the seventh decade of life.

A comparison of the figures of the Leipzig and Innsbruck Clinics is especially interesting. It shows that, during the same period of time, the former clinic received for treatment almost 11 times as many cases of urinary calculus as the latter. This difference is difficult to explain. Perhaps milk and milk products, which are the staple foods in the Tyrol, may protect against stone formation, or perhaps the thyroid gland plays such a role in mountainous regions.

Of the 719 cases reviewed, 51.2 per cent were treated conservatively and 48.8 per cent by operation. The fact that, of those treated conservatively, 241 (65 per cent) were cases of ureteral calculus shows how frequently mechanical methods are sufficient for the removal of stones from the ureter.

At the Leipzig Clinic nephrotomy is performed much less frequently for calculus disease than

pyelotomy. Of the cases reviewed the former was performed in 47 and the latter in 141. Of the 94 male patients treated by pyelotomy, none died, whereas of the 47 females 3 died.

In the 42 cases of stone in the ureter in which ureterotomy was done there were 2 deaths. In 8 cases the ureteral orifice was split outward from within the bladder for removal of the stone.

Primary nephrectomy was done in 48 cases with 3 deaths a mortality of 6.2 per cent. This radical operation was limited to cases with very severe functional injury of the kidney or marked infection. Nephrectomy was done as a secondary procedure in 15 cases in which a previous conservative operation such as pyelotomy, ureterotomy or nephrotomy had been unsuccessful. In these cases there were 2 deaths.

The author discusses 5 cases in which after removal of one kidney for calculus disease stones were formed in the other kidney after a period ranging from 10 months to 30 years. In 17 cases in which a number of operations exclusive of nephrectomy were performed there were 7 deaths a mortality of 41.1 per cent. In only 5 cases in which operation was done was the diagnosis of stone found to be erroneous.

Of the 42 cases of bladder stone, all were treated surgically. The usual procedure was suprapubic cystotomy. The stone was broken up in the bladder in only 7 cases. There were 3 deaths. The author discusses especially 2 cases of bladder stone in children 4½ and 11 years of age.

Three cases of calculus formation secondary to an accident are reported. The injuries were a fracture of the pelvis, a fracture of a transverse process of a vertebra and crushing of the abdomen.

Citing reports by others the author states that bone injuries and suppurative processes in bones are more apt to cause secondary urinary calculus formation the nearer they are to the kidney. Of special importance as regards this sequela are injuries and suppurative processes in the bony pelvis, the hip joint and the lumbar vertebral column.

In conclusion 4 very interesting cases of urinary calculus associated with osteitis fibrosa and 1 case of urinary calculus associated with Bechterew's disease are reported. Attention is called to the fact that while these diseases favor the formation of urinary calculi bone carcinomas (from the breast and prostate) which also cause considerable bone disturbance and loss of calcium do not.

(MAX RUDE; JOHN W. BRENNAN, M.D.)

# SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS

## CONDITIONS OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC

Bergstrand, H. Notes on the Genesis of Giant-Cell Tumors. *Am J Cancer*, 1936, 27, 701

Because of its benign nature, the so called giant cell sarcoma has come to be designated by many pathologists and clinicians as a "tumor" rather than a "sarcoma." Some German writers have even questioned the neoplastic nature of the growth, regarding it as the result of a process similar to the formation of granulation tissue.

According to Geschickter and Copeland, the formation of giant cell sarcomas is analogous to the change from cartilage to bone in embryonal life, and the bone resorption associated with these tumors is caused by the giant cells. In support of this theory is the fact that the tumors occur only in the parts of the skeleton which are preformed in cartilage. Haggquist and others believe that the giant cell tumor is intimately related to normal bone formation and bone resorption processes as the tissue produced by both of these processes is very vascular and contains giant cells.

In some cases of osteitis fibrosa (von Recklinghausen's disease) there are formations causing masses exactly like giant cell tumors, which contain giant cells, fibroblasts, or more rounded cells, some of which show mitosis. The process then seems to be a decalcification and resorption of collagenous substance in the bones which sets free the original bone forming elements—i. e. breaking up of the tissue into a less differentiated form. The giant cells arise by fusion of bone corpuscles and by nuclear division.

Although the genesis of the single giant cell tumor is not known, it is possible that the neoplasm is due to local resorption, the result, perhaps, of a circulatory disturbance. If this theory is correct, the tumors are neither granulation tissue nor neoplasms. Against the neoplastic theory is the fact that the proliferation gradually ceases and the giant cells then disappear. WILLIAM ARTHUR CLARK, M.D.

Niosi, F. Articular Chondromatosis—Osteochondromatosis (La chondromatose—osteochondromatose—articulaire). *Policlin*, Rome, 1936, 43 sez. chir. 369

Niosi reports a case of chondromatosis of the knee which was treated successfully by extensive synovectomy, presents a comprehensive discussion of the condition with special emphasis on the pathogenesis, and reviews the literature.

He regards chondromatosis as a disease entity and accepts the reticulo endothelial theory of its origin which was first advanced by Castiglioni in 1930. According to this theory, the condition is a

hyperplasia and chondroid or osteochondroid metaplasia of the reticulo endothelial cells normally present in the synovial membrane. In the case he reports Niosi was able to trace the evolution of immature reticulo endothelial cells, situated beneath the surface of the membrane and in the villi, through the precartilaginous myxoid stage into cartilage cells. In some areas bone formation by direct metaplasia of the cartilage was observed. Niosi states that the stimuli causing proliferation and metaplasia of the reticular cells are probably repeated minimal traumas and increased acidity of the synovial fluid. Apparently the hydrogen ion concentration of the synovial fluid in chondromatosis has been determined only in the case reported by Pettinari in 1934 and that reported by Iomado and Saito in 1935. In both these cases the acidity was increased.

Although chondromatosis is usually a hyperplastic and metaplastic process, it may occasionally pass over into a benign tumor. It is closely allied to Kauffmann's proliferative synovitis and Schuller's chronic villous arthritis, the reticular tissue tending to form fibrous and fatty tissue in lipoma arborescens and osteochondroblasts in chondromatosis.

The operation of choice for articular chondromatosis is complete synovectomy. However, if the disease has run its course, removal of the free and pedunculated bodies is sufficient. Removal of all the bodies in the joint cavity is not always possible by arthrotomy even when synovectomy is done. In several cases, including the case reported by Niosi, the shadows of the bodies left in the cavity after operation subsequently became lighter and smaller because of decalcification. Roentgen ray treatment following removal of the largest and most disturbing bodies may stabilize the process at the existing stage.

The article is accompanied by photographs, roentgenograms, and a bibliography.

M. F. MORSE, M.D.

Fontaine, R. and Kunlin, J. A Contribution to the Study of Volkmann's Syndrome of Vascular Origin. Prophylactic or Abortive Treatment by Immediate or Early Operation on the Injured Artery (Contribution à l'étude du syndrome de Volkmann de cause vasculaire. Son traitement prophylactique ou abortif par l'intervention immédiate ou précoce sur l'artère lésée). *J de chir*, 1936, 48, 161.

In 1927 Lenche reported a case of Volkmann's paralysis following a fracture at the elbow in which a complete rupture of the humeral artery was discovered at operation. After resection of the ends of the torn artery the muscular symptoms rapidly disappeared. Similar lesions have been reported by others. The artery has been found partly or wholly obliterated, completely torn, or only contused and



spastic. In cases of partial obliteration periarthral sympathectomy may be beneficial. If this procedure fails it is justifiable to conclude that the symptoms are not of arterial origin. To be of value, the operation must be performed early. After the hematoma has organized and sclerosis of the muscle has developed there is not much chance for good results from operation on the artery. The diagnosis should be made early by determining the character of the pulse with the oscillogram or if necessary by arteriography. It is not the tight cast but injury to the artery which is responsible for the symptoms.

The authors report 2 cases. In the first that of a boy 6 years old a supracondylar fracture of the humerus was followed by marked swelling and loss of the radial pulse. The diagnosis of vascular lesion having been confirmed by oscillogram, operation was performed within 2 hours after the accident. Through an incision made over the front of the elbow a hematoma evacuated. The humeral artery was found compressed against the end of the proximal fragment of the bone. As there had been no attempt at reduction the compression of the artery was due to the trauma causing the fracture. Immediately after its liberation the artery began to pulsate. Decortication of the artery for a distance of about 5 cm. was done and the fracture then reduced. There was never any sign of ischemia. Normal function of the arm and hand was regained.

In the second case symptoms of Volkmann's paralysis appeared 24 hours after the reduction of a supracondylar fracture and the application of a cast. At exploratory operation the humeral artery was found totally contracted in the middle of a hematoma. The artery was liberated and a 4 per cent solution of novocain injected into its walls. There upon the pulse returned immediately, and at the end of the operation the fingers were warm and less cyanotic than before. When the patient was last seen by the authors 7 months after the operation, the hand and arm were normal.

These cases show that ischemia and paralysis can be prevented if intervention is done early. The indications for operation are extreme swelling, cyanosis and loss of the radial pulse.

WILLIAM ARTHUR CLARK, M.D.

Jenkins J. A. Spondylolisthesis. *Brit J Surg* 1936 24: 80

The author reports the case of a boy 16 years of age who complained of a deformity of the hip which was first noticed a year previously and had become progressively worse. The patient was easily tired, greatly handicapped by the posture he was forced to assume, and suffered pain in the lower part of the back after exercise. He stated that he was unable to remember any serious accident but had played the usual school games and had suffered the usual injuries associated with such contests.

A roentgenogram taken when he was first seen showed complete displacement of the body of the fifth lumbar vertebra. The lower border of this

vertebra lay opposite the second sacral vertebra. After the patient's admission to the hospital reduction was attempted by continuous extension. The pelvis was suspended by a sling to an overhead frame and by means of Sinclair's glue extension was applied to both legs and the pelvis at one end and to the chest at the other. From 60 to 70 lb. of weight was used. The patient was encouraged to manipulate his pelvis at frequent intervals by catching the slings in his hands and forcibly pushing them away. On the fourth day he noted a grating sound and a change of position, and examination showed that the deformity had largely disappeared. A roentgenogram then disclosed that the lower surface of the fifth lumbar vertebra was resting on the upper surface of the sacrum but there was about a half vertebra overlap in the anteroposterior direction. No further improvement was achieved by manipulation and extension although they were continued for a week longer.

On December 10, 1934, operation was performed under rectal anesthesia induced with paraldehyde and followed by spinal anesthesia induced with novocain and supplemented by light ether anesthesia. The method of fixation was that suggested by Capener. The abdomen was opened by a right paramedian incision extending from above the umbilicus to a point a little above the pubes. The intestines were packed off and the sacral promontory was exposed. The peritoneum over the promontory was then incised for 3 in. and the nerve plexus, left common iliac vein and bifurcation of the aorta were defined. The anterior longitudinal ligament of the spinal column was divided for 1 1/2 in. over the anterior aspect of the fifth vertebra. Slight oozing which occurred here was somewhat troublesome throughout the operation. With a bone drill 1/4 in. in diameter a hole was made through the body of the fifth lumbar vertebra into the anterior aspect of the first sacral vertebra for a distance of slightly more than 2 in. and a bone graft cut from the tibia with an Albee saw was driven into the tract made for it. The graft fit tightly and firmly. Closure of the anterior longitudinal ligament over the graft was found impossible. Horsley's wax was used to stop slight bone oozing. The posterior parietal peritoneum was closed and the abdomen sutured in the usual way. The operation took an hour and a quarter but the patient's condition gave no cause for anxiety at its termination. Apart from a pain ranging from 110 to 120 for a few days convalescence was uneventful.

Roentgenograms taken on February 8 showed the graft pinning the fifth lumbar vertebra to the anterior aspect of the body of the first sacral vertebra. Following the application of a plaster spinal support the patient was allowed to get up. Since the removal of the support 3 months later the patient has been able to carry on ordinary activities without any support.

Whether the operation described will become the procedure of choice for spondylolisthesis will not be

known until it has been performed in a large number of cases. The strain on the graft, though considerable, is not so great as might be assumed since, because of the inactivity of the fifth lumbar vertebra to slip forward, most of the weight is transmitted through the upper surface of the body of the first section of the sacrum. As the operation presents difficulties and risks much greater than those encountered in posterior grafting by the Albee method, its results must be proved better than those of the latter procedure if it is to be adopted.

In conclusion the author states that in the next case, in addition to the grafting, he will attempt to increase bony union between the fifth lumbar vertebra and the sacrum by elevating bone flaps and obtaining direct bone union between the vertebrae themselves.

NORMAN C. BULLOCK, M.D.

Mercer, W. Spondylolisthesis with a Description of a New Method of Operative Treatment and Notes of 10 Cases. *Edinburgh M. J.*, 1936, 43, 545.

In recent years, spondylolisthesis, at one time believed to be rare and to occur almost exclusively in females, has become more familiar to the surgeon in connection with accident cases and has been found more frequently in males. In industrial medicine and traumatic surgery it is becoming more widely recognized as a factor in backache.

Spondylolisthesis is a gradual displacement forward, either of the rest of the vertebral column in relation to the fifth lumbar vertebra, the sacrum, and the pelvis, or of the whole vertebral column in relation to the sacrum and the pelvis. In other words, it is a forward subluxation of the body of the fourth or fifth lumbar vertebra together with the superimposed vertebral column on the vertebra below it or on the sacrum.

The cause of the condition is unknown, but increasing experience tends to indicate that, whether it occurs suddenly or insidiously, it is primarily the result of a congenital cleft in the laminae of the neural arch. A bilateral cleft of the neural arch has been a constant anatomical finding in every specimen of spondylolisthesis studied.

The author believes that trauma also plays an important part in the occurrence of the condition as sudden violence may tear the fibrous attachment between the neural arch and the vertebral body and mild repeated traumas may stretch the fibrous tissue bridging the congenital cleft.

The condition is undoubtedly favored also by lordosis. In extreme cases of this condition the sacrum is nearly horizontal. Therefore the weight of the trunk, coming down on the body of the vertebra, tends to push the last lumbar vertebra downward and if this vertebra has lost the support of the interarticular locking with the first sacral segment, the weight propels the body of the vertebra forward.

There are also types of spondylolisthesis in which the upper surface of the sacrum is sharply convex, the front half sloping downward at an acute angle. Under such conditions the body weight has only a

weak obstruction to overcome before it forces the last lumbar vertebra downward.

That obesity is a factor in the causation of spondylolisthesis is suggested by the fact that many persons with the condition are unduly stout. Pregnancy also favors its occurrence or aggravates it.

As a rule there is a history of single or repeated trauma, but occasionally there has been no previous injury. The condition generally begins after puberty and is often first recognized in women at the time of parturition. The usual complaint is a dull aching pain referred to the lumbar region and radiating down into both legs which is increased by prolonged standing, the carrying of heavy objects, and exercise increasing the mobility at the lumbosacral joint, and is relieved by rest. The most prominent clinical evidence of the condition is the characteristic lateral view of the patient. The shortening of the trunk produces also a more or less marked transverse skin furrow encircling the trunk in the region of the loins, and folds in the skin which, in the female, may hang down over the pubis and cover the external genitalia. The telescoping of the spine causes also a diminution of the space between the ribs and the iliac crests and between the xiphoid cartilage and the pubis. Vaginal examination reveals a reduction in the anteroposterior diameter of the pelvic inlet. Some times the patient walks with a waddling gait, the legs being spread widely apart.

The diagnosis is confirmed by roentgen examination. In well marked cases both anteroposterior and lateral views are characteristic.

The symptoms are relieved quickly by complete rest in the supine position on a fairly firm bed. Traction and counter traction may be beneficial. Later the patient may be supported and given a feeling of security and comfort by wearing a well-fitting spinal support. However, for those who must work and whose physical condition permits it, surgery is the treatment of choice.

The author describes his operation with an anterior approach through the abdomen. Autogenous bone grafts taken from the crest of the ilium are wedged into a rectangular space made between the fifth lumbar vertebra and the upper margin of the sacrum and are fixed in place with metal screws.

Mercer reports 10 cases, 2 of which were treated by the operation described. One of the patients operated upon died on the eighth postoperative day from superior mesenteric thrombosis, but the other made an uneventful recovery and is now able to work.

NORMAN C. BULLOCK, M.D.

L'Episcopo, J. B. Suppurative Arthritis of the Sacro-Iliac Joint. *Ann. Surg.*, 1936, 104, 289.

This article is based on 5 cases of suppurative arthritis of the sacro iliac joint which were treated by the author and 6 cases seen by him in consultation or by courtesy. L'Episcopo says that the condition has received little attention in the literature.

The disease may start in the sacro iliac joint or in the bones adjacent to it. Its course is similar to that

of pyogenic arthritis of other joints. Free pus was found in the pelvic cavity in 3 of the author's 5 cases and abdominal symptoms were present in all. Pus forming within the joint capsule breaks through at the point of least resistance which is the anterior aspect of the joint. From there it may pass (1) down the psoas sheath to point on the inner aspect of the thigh (2) along the pectineus muscle to the posterior side of the thigh (3) into the hip joint (4) along the obturator internus, to point behind the tip (5) along the pyramiformis to the lower gluteal region (6) upward into the lumbar region or (7) anteriorly and upward toward the iliac crest into the abdominal wall.

The onset of the condition is similar to that of acute osteomyelitis being accompanied by a high temperature and chills. The pain is not definitely localized. It may be in the buttocks or the lower part of the abdomen and depending on the joint involved on the right or the left side. Vomiting and other misleading abdominal symptoms may develop. The hip on the affected side may be flexed. Rotation of the body is especially painful because of the associated opening and closing of the joint. Tenderness is found on pressure over the posterior aspect of the sacro iliac joint and there may be a palpable mass in the iliac fossa. Edema from pressure on the iliac veins may be noted. In 1 of the cases cited pressure on the lumbosacral plexus caused foot drop which persisted until death.

Early diagnosis is aided by the following signs and symptoms: pain of increasing severity over the joint; extreme pain on torsion of the trunk; swelling in the upper thigh or the iliac fossa; fever of from 102 to 104 degrees F; a rapid pulse and a high leucocyte count. In the first 2 weeks roentgenograms may be negative. Tuberculosis of the spine, acute appendicitis and osteomyelitis of the neck of the femur must be ruled out.

The prognosis is very poor and is more unfavorable the older the patient. Because of the remoteness of the focus and the difficulty of draining it the mortality is higher than in pyogenic arthritis of other joints. The lesion is always complicated by osteomyelitis of the adjacent bones and sometimes by destruction of muscles in the path of the pus.

The treatment should include adequate posterior drainage. This is established best by opening a window into the sacro iliac joint through the ilium. In the operation performed by the author the part of the sacrum which goes to form the joint is removed. This procedure exposes the pelvic cavity where pus is usually found. The wound is packed with vaseline gauze and left open. Dressings are done as infrequently as possible preferably at intervals of not less than 2 or 3 weeks. A plaster spica is applied immediately after the operation or if the patient's condition will not permit this weight extension is applied and a cast is put on later. Secondary abscesses must be drained whenever they appear. If the patient's condition is so poor that the described radical operation cannot be done the soft

tissue abscesses should be drained to diminish the toxic effects and the bone work delayed.

The author's 5 case histories may be summarized briefly as follows:

**Case 1.** A woman 24 years of age developed severe pain in the pelvis following a miscarriage. About a week later the symptoms were centered over the left sacro iliac joint and roentgenograms showed partial destruction of the joint. The radical bone operation described was performed. A pathologic dislocation of the sacro iliac joint was found. Pus was evacuated from the iliac fossa through the operative incision. The patient was discharged about 4 months later walking well and wearing a sacro iliac belt.

**Case 2.** The patient was a man 20 years old who was admitted to the hospital March 31, 1933, complaining of general weakness and pain in the back. The pain soon became localized in the left sacro iliac region. Drainage of a soft tissue abscess was done on April 17 and radical bone window drainage on May 4. In August the temperature went up to 103 degrees F and an abscess was drained through the lower abdomen on the left side. This abscess communicated with the posterior incision. When the patient was discharged in March 1934 he was able to walk but had an ankylosis of the hip due to the infection. There was then no evidence of active bone disease in the sacro iliac joint.

**Case 3.** A girl 19 years of age was admitted to the hospital with a temperature of 102 degrees F, tenderness of the abdomen and acute pain. Flexion of the right hip suggested acute arthritis of that joint. The tenderness soon became localized in the right sacro iliac joint and arthrotomy on that joint was done. A small amount of pus was found. The right hip was also involved. After the formation of many secondary abscesses and gradually increasing general weakness the patient died about 4 months after the onset of the symptoms. Autopsy revealed a large abscess behind the psoas muscle which extended from the brim of the pelvis upward to the level of the first lumbar vertebra.

**Case 4.** A child of 5 years complained of pain in the abdomen and right buttock 6 days after a fall. A week later the right sacro iliac joint was opened at operation and a pus pocket was found. The child was discharged 7 months later apparently well. At the end of 18 months he came back with a recurrence of symptoms which this time suggested appendicitis. The right sacro iliac joint was again opened and 2 days later pus was discharged from the wound. At laparotomy the appendix was found normal. The patient recovered in 2 months.

**Case 5.** A woman 46 years of age developed chills and fever followed by pain in the right hip region which radiated down to the knee and ankle. The pain gradually became more severe and ultimately confined the patient to bed. A large mass was palpable in the right iliac fossa and another in the lower gluteal region behind the right hip. Tenderness was present over the right sacro iliac joint.

Roentgenograms were negative. The poor condition of the patient contra indicated operation. Pus was aspirated from the gluteal swelling, but could not be obtained from the iliac fossa. Death occurred 10 days later.

WILLIAM ARTHUR CLARK, M D

Fyre-Brook, A L Osteochondritis Deformans Coxæ Juvenilis or Perthes' Disease. Results of Treatment by Traction in Recumbency. *Brit J Surg*, 1936, 24 166

This article is based on a series of 41 cases of osteochondritis deformans coxæ juvenilis. The patients ranged in age from 3 years and 3 months to 16 years. Thirty one of them were males. In 4, the disease was bilateral.

The earliest roentgen findings in this condition are (1) increased density of the epiphysis, (2) increased depth and clarity of the joint space, (3) flattening of the epiphysis, (4) metaphyseal "cavitation", and (5) the Courtney Gage sign, lateral metaphyseal erosion. Later findings are (1) flattening and fragmentation of the epiphysis, (2) broadening of the femoral neck, (3) confluent cavitation of the metaphysis, (4) partial collapse of the metaphysis, (5) regeneration, (6) condensation of the regenerated epiphysis, (7) partial disappearance of the epiphyseal line, (8) appearance of the transverse cervical line and (9) adaptive acetabular changes.

For statistical purposes the author has introduced the epiphyseal index

$$\frac{\text{height of epiphysis}}{\text{breadth of epiphysis}} \times 100$$

The aims of treatment should be to maintain a full range of motion in the hip and to obtain a round femoral head adapted to the acetabulum. The prognosis is more favorable in the cases of younger children than in those of older children, and more favorable in those in which the femoral head is shaped like a mushroom than in those in which it is shaped like a cap. Motion is preferable to complete immobilization in a cast as motion will prevent muscular atrophy and may help to keep the head of the femur round. Weight bearing must be prohibited, and pressure of the femoral head against the acetabulum due to muscle tension must be prevented. In the cases of younger children the latter is prevented best by simple sliding traction in bed. For older children the author advocates a caliper brace, crutches, and a patten on the shoe on the normal side. He states that a walking caliper splint in which weight is borne on the affected side is not sufficient protection for the hip joint. The duration of treatment is from 18 to 24 months. A roentgen examination should be made every 3 or 4 months.

In the cases of children 7 years old the results of treatment as demonstrated by roentgenograms are excellent. The head of the femur shows a remarkably close approach to normal especially in the cases in which treatment was started early. In the cases of patients over 7 years of age the shape of the head of the femur is less well restored.

On the whole, the results in the 41 cases reviewed indicate that the extra effort required to treat Perthes' disease by traction in recumbency is justified.

WILLIAM ARTHUR CLARK, M D

## FRACTURES AND DISLOCATIONS

Kistler, G H Effects of Circulatory Disturbances on the Structure and Healing of Bone Injuries of the Head of the Femur in Young Rabbits. *Arch Surg*, 1936, 33 225

The normal circulation of bone and the importance of the various sources of blood and collateral circulation are still subjects of controversy. After reviewing recent opinions, the author reports the findings of experiments which he carried out to study the normal blood supply of the growing femoral head in rabbits and to determine the relative importance of the various sources of blood in growth and the repair of injuries.

One hundred and sixty six rabbits ranging in age from 12 hours to 35 days were used. The experimental procedures were (1) ligation or evulsion of the principal nutrient artery to the shaft, (2) interruption of the vessel that passes through the trochanteric notch, (3) division of the ligamentum teres, (4) division of the ligamentum teres and interruption of the vessels that pass through the trochanteric notch, (5) division of the ligamentum teres and ligation or evulsion of the principal nutrient artery to the shaft, (7) ligation of the neck of the femur with black silk, (8) division of the ligamentum teres and ligation of the neck of the femur with black silk, (9) fracture of the head of the femur, and (10) division of the ligamentum teres and fracture of the head of the femur. From a few hours to 76 days after the operation the animals were killed and the gross and microscopic findings studied. The opposite extremity was used as a control. The findings are reported in detail with photomicrographs.

From his experiments the author concludes that the most important source of blood to the head of the femur in growing rabbits is the small vessels entering this epiphysis from the periosteum where the capsule of the hip joint is attached at the margin of the articular cartilage. Blood is contributed also by the ligamentum teres. If either of these 2 sources is interrupted the remaining one will be adequate for growth and for repair. There is no noteworthy vascular connection between the medullary tissues of the shaft and the head through the intervening cartilage plate. The repair of an intracapsular fracture of the femoral head in growing rabbits is retarded if either of the 2 sources of blood to the head is interrupted. Interference with the ligamentum teres and complete intracapsular fracture of the head produce marked necrosis of the loose fragment, but the latter may be revascularized and replaced by new bone if it is fixed in apposition with the fracture surface of the neck. In young rabbits, a femoral head attached only by the ligamentum teres will not only continue to grow but will become larger than

the control bead, probably because the part has no weight bearing function

The author questions the extent to which these observations are applicable to man, but feels that the underlying principles are important for an understanding of pathologic changes occurring in the head of the femur  
BARBARA B STIMSON M D

Gaenslen F J *Fracture of the Neck of the Femur* *J Am M Ass*, 1936, 107 105

The author discusses the reduction of fractures of the femoral neck by traction in flexion and the immobilization of such fractures by internal fixation. He states that impacted fractures in slight valgus position heal successfully in almost every instance. He attributes this fact to (1) practically complete apposition of the fragments (2) complete immobilization by virtue of the impaction, (3) the probable absence of serious damage to the vessels carried by the capsula reflexa (4) the absence of interposed capsule, (5) the early resumption of motion, and (6) the relative infrequency of aseptic necrosis.

Studies were undertaken in an attempt to reproduce this position. Dissecting room specimens consisting of an intact femur and the corresponding half of the pelvis were stripped of the muscles, the capsule being left intact. The upper portion of the pelvis and the lower portion of the femur were countersunk in concrete. The specimens were placed in a testing machine and gradually increasing pressure was applied until a fracture occurred. All the fractures occurred in the femoral neck. Not infrequently the capsule was torn, and in several instances it was caught between the fragments. Abduction and traction in extension with a blow on the trochanter failed to produce impaction and valgus. Flexion of the hip to 90 degrees invariably released the caught capsule. Upward traction in flexion restored the length. Anteroposterior displacement was corrected by manual pressure on each side of the trochanter.

On the basis of these findings the author devised a method of maintaining this position during the insertion of pins. Posterior molded plaster shells holding the knees and hips in flexion of 90 degrees are supported on adjustable frames so that the pelvis swings free from the table. Abduction and slight internal rotation are also considered important. With the patient in this position, both anteroposterior and lateral roentgenograms can be taken without changing his position. The author believes that during hip flexion the muscles lying anterior to the joint are relaxed and those posterior are stretched. He gives a brief historical summary of the use of flexion in reduction and of the use of internal fixation.

He feels that the frequency of non union in non impacted fractures is due not to lack of circulation but to inadequate immobilization since, in cases of non union, bony healing occurs following the high Sebanz osteotomy which eliminates the shearing force. In experiments on dogs he interposed capsule between the fractured ends of the femoral neck and then pinned the fracture. In the 5 cases in which reduction and spike fixation were satisfactory firm bony union resulted indicating that interposition of capsule need not necessarily result in non union. Early activity is an important factor in promoting union and is made possible by adequate internal fixation.

In conclusion the author says that no one method of reduction will fit all cases and not all fractures properly reduced and properly apiked will go on to solid union. There is clinical and experimental evidence that internal fixation has decided advantages over external fixation and that present day conventional methods while representing a distinct advance as compared with earlier methods will give way to more precise and more certain procedures.

The article is illustrated by drawings, photographs, and roentgenograms.

BARBARA B STIMSON M D

# SURGERY OF THE BLOOD AND LYMPH SYSTEMS

## BLOOD VESSELS

Freund, E. Diffuse Genuine Phlebectasia. Report of a Case. *Arch Surg*, 1936, 33, 113

Bockenhimer, in 1907, reported a case in which there was marked diffuse enlargement of the veins of the varicose and cavernous type extending from the palm of the hand into the axillary veins. There was no involvement of the arteries and no arteriovenous communication. He considered the condition as *sui generis* and designated it by the term "genuine diffuse phlebectasia."

Freund reports the case of an eight year old girl with a fluctuant swelling in the shoulder region due to enlargement of venous blood spaces and calcified phleboliths. The lesion started early in childhood and was slowly progressive. Nothing suggested participation of the arteries in the pathological process. The skin over the shoulder region was free from discoloration and appeared normal. The condition, therefore, involved mainly the deeper veins within and under the shoulder muscles. The changes were relatively mild, probably because of the youth of the patient.

On basis of this case and the fifteen cases reported in the literature, Freund gives a full description of the clinical picture of genuine diffuse phlebectasia. The condition is a slowly progressive lesion of a smaller or larger region of the venous system of an extremity. Of the fifteen cases collected from the literature, an upper extremity was affected in nine and a lower extremity in six. Nine of the patients were men and six were women. The involved area shows enlargement of all the veins into the finest ramifications without predominance in any special anatomical distribution. There does not seem to be a new formation of vessels as is the case in bone hemangioma. However, definite differentiation of diffuse phlebectasia from hemangioma is difficult even by anatomical investigation. The difference is probably only one of degree. The enlarged veins form large strands and tumor-like prominences over which the skin frequently becomes atrophic so that the ectatic veins show through the skin as dark blue or bluish red. They can easily be compressed, and they disappear when the extremity is elevated for a while.

The lesion develops spontaneously. It probably has the congenital basis of a faulty anlage of more or less extensive regions of the venous vessel system. The unilaterality of the involvement, the relatively frequent association of the phlebectasia with cutaneous hemangioma, and the usual onset of the condition in early childhood point toward a congenital maldevelopment of the venous vessel wall. There seems to be a constitutional weakness of the vessel wall. The media is very poor in muscle cells and

elastic fibers. Thrombosis, probably due to the anomalous blood flow in the ectatic spaces, is a constant occurrence. Organization with recanalization of the thrombi or calcification takes place frequently. In the differential diagnosis the presence of numerous phleboliths is of importance.

The symptoms are characteristic, and when the clinical picture is known the diagnosis is very easy. The involvement of the extremity may be associated with a disturbance of growth in length. The lesion is relatively benign and its course extends over many years. Because of the atrophy of the muscles and limitation of motion (due to the venous swelling), the use of the affected extremity is decreased. Numbness, paresthesia, and ulceration of the skin with infection and even gangrene may occur. The prognosis is not good. The lesion is progressive, and if left alone will sooner or later lead to serious complications. Radical excision and ligation of the enlarged veins have been performed with questionable results. Recurrence seems to be the rule. In the author's case x-ray treatment was given, but the period of observation has been too short to warrant conclusions as to the result.

Pampari, D. Arteriography and Arterectomy in Traumatic Lesions of the Arteries. Considerations Based on a Clinical Case of Volkmann's Syndrome. (*L'artériographie et l'artérectomie dans les lésions traumatiques des artères. Considérations sur un cas clinique de syndrome de Volkmann*). *Rev de chir*, 1936, 55, 431.

After presenting a brief review of the development of arteriography in which he states that thorotrast has been found the best opaque medium for this procedure, Pampari reviews the work of Leriche and his associates in developing arterectomy in the treatment of injuries to the arteries and certain cases of localized arteritis. According to Leriche, arterectomy, or resection of the injured arterial segment, causes a vasodilatation of the subjacent blood vessels and often re-establishes the circulation by the collateral route to a degree sufficient for complete relief of the severe symptoms of arteritis. He believes that in cases in which the arterial obstruction is due to embolus the treatment of choice is embolectomy, but that arterectomy should be done if the arterial walls are so greatly damaged that embolectomy does not relieve the symptoms. This operation is contra-indicated in aged persons and in cases in which the collateral circulation is not sufficient.

The author reports the case of a boy 14 years of age who had sustained a fracture of the humerus near the epiphysis which resulted in an injury to the arteries so serious as to cause obstruction with beginning gangrenous changes in the forearm and

hand. Although amputation seemed to be inevitable, Pampari believed that arteriotomy might restore the circulation sufficiently to render it unnecessary. Arteriography with thorotrast showed that the opaque medium did not enter either the radial or the ulnar artery below the site of the fracture though it penetrated the interosseous arteries. At operation from 3 to 4 cm. of both the ulnar and radial artery were resected. After the operation heat was applied for 5 hours by means of a thermophore. Following this treatment the hand became and remained warm the skin showed a rosy tint where there were no phlyctenae and tactile sensation returned. The suppurative and gangrenous lesions healed more slowly. The thumb and forefinger which had become mummified were lost. Six months after the boy was discharged from the hospital the movements of the elbow joint were almost completely restored. The tactile sense of the hand and fingers was not restored in as large an area as at the time of discharge but the hand was warm and the fingers were capable of some movement especially flexion.

Attention is called to the fact that in this case the conditions were not favorable for arteriotomy as the operation should be done early and in healthy non infected tissues. Nevertheless the results obtained while not entirely satisfactory were certainly preferable to those of amputation. They indicate that if the operation had been done earlier before the tissue changes had become so far advanced healing would have been complete. The case demonstrates also the value of arteriography previous to arteriotomy as this procedure revealed the site and extent of the lesion clearly so that localization of the injured segments at operation was greatly facilitated and time and manipulation were saved.

The author is of the opinion that arteriography should be done in every case of fracture in which there is a possibility of arterial injury.

ALICE M. MEYERS

David V. C. Aneurisms of the Hand. *Arch Surg* 1936 33 267

The author reports a case of congenital arteriovenous aneurism of the hand in a boy nine years of age.

The most striking features of this case were the insidious onset of the condition, considerable hypertrophy of the third and fourth fingers immediately distal to the arteriovenous fistula, a definite venous pulse and capillary pulse, increased warmth of the hand and the reliability of the stethoscope in disclosing the point of greatest intensity of the double bruit and consequently the site of the arteriovenous fistula. Visualization of the arterial tree and immediate filling of the veins after the injection of skiodan into the ulnar artery did not conclusively show the site of the fistula.

In cases of arteriovenous fistula in the hand or a finger cardiovascular symptoms are usually absent as

less blood passes through the fistula. In the type of congenital arteriovenous fistula occurring in the author's case, the process frequently involves the arm secondarily or coincidentally to a greater or less extent, in which event bradycardia may be present.

In the treatment of the case reported David ligated and removed a portion of the ulnar artery, the digital arteries and veins to the third and fourth fingers and the dilated communicating branches to the deep palmar arch.

An aneurism developing as the direct result of trauma is by far the most common form of aneurism of the hand. It is usually due to weakening of the arterial wall either by blunt force which causes an aneurismal dilatation or more commonly by sharp force such as a wound from a knife or glass which injures the division of the artery and results in the development of a false aneurismal sac. Much rarer is an arteriovenous aneurism developing as the result of direct simultaneous injury of the artery and veins.

The treatment of traumatic aneurisms of the hand should be radical. Excision of the sac is much better than ligation of the vessels that enter and leave the sac.

David reports two cases of traumatic aneurism of the hand which involved the radial artery on the dorsum of the hand in the snuff box space formed by the extensor pollicis longus and the extensor pollicis brevis muscle. In one case both the artery and the vein were involved in the formation of the arteriovenous fistula and there were arterial and venous bruits. Both cases were cured by radical excision of the false aneurismal sac.

JOHN J. MALONEY, MD

## BLOOD, TRANSFUSION

Mettler S. R. Stone, R. S., and Purviance L. The Effect of Roentgen Ray Irradiation on Platelet Production in Patients with Essential Thrombocytopenic Purpura Hemorrhagica. *Am J Med Sci* 1936 191 704

In view of the fact that there has been some controversy over the efficacy of roentgen ray treatment in cases of idiopathic purpura hemorrhagica and as platelet deficiency is of considerable importance in the causation of hemorrhage it seemed to the authors desirable to make a careful estimation of the platelets in the circulating blood of patients with idiopathic purpura hemorrhagica before and after the administration of a known roentgen ray dosage. Seven patients with purpura hemorrhagica of varying duration and severity of symptoms were studied. The histories of these patients are reported in detail.

Platelet counts were made daily while the patients were in the hospital for treatment and at intervals of from approximately one week to one or more months after their discharge. During the period of roentgen ray administration all other

forms of therapy which might influence the platelet production were omitted. The factors in the irradiation were 200 kv, a constant potential, 15 ma, a target skin distance of 50 cm, and a composite filter consisting of 0.2 mm of tin plus 0.25 mm of copper plus 2 mm of aluminum. With these factors the apparatus delivered 28.2 r per minute as measured without backscatter. The size of the field on the skin varied with the size of the patient and the size of the spleen. The smallest field was 10 by 10 cm and the largest, 10 by 20 cm. The rays were directed toward the spleen from the front, the back, and the side. One field a day was irradiated. The daily dose varied between 200 and 300 r. The total dose was from 1,200 to 3,300 r given in from six to fifteen days.

Of four cases of acute recurring thrombocytopenia, all showed a definite increase in the circulating platelets following the irradiation. Coincident with the platelet response there was a gradual lessening of the hemorrhagic tendency with a subsequent return to normal of the clotting mechanism. In the cases of three patients who had increased fragility of the capillaries prior to the treatment, the tourniquet test showed a negative response ten days after the beginning of the irradiation. Two of the patients developed a recurrence of symptoms, but the condition again responded favorably to irradiation.

In two cases of chronic thrombocytopenia with recurring purpura various other forms of therapy had been used with indifferent results prior to the irradiation. None produced any marked increase in the number of platelets. After irradiation both of the cases showed a sharp rise in the number of platelets with coincident clinical improvement, but the results were of relatively short duration. In one of these cases splenectomy had been done and irradiation was given over the long bones.

A patient with acute fulminating purpura proved refractory not only to irradiation but also to all other forms of treatment and died of hemorrhage soon after splenectomy.

From the observations made it appears that by roentgen irradiation in adequate dosage over the spleen or long bones an increase in the blood platelets may be obtained in essential thrombocytopenic purpura hemorrhagica. Six out of seven patients with a count of from 10,000 to 40,000 before treatment showed increases beginning within from twenty-four to forty-eight hours and going up to as high as from 250,000 to 500,000 per cubic millimeter in nine days. This increase was accompanied by cessation of the bleeding and disappearance of the hemorrhagic tendency. So far as cure is concerned, the results were not entirely satisfactory, as in some of the cases the symptoms recurred from one to seven months after the treatment was stopped.

The authors briefly discuss the causation of the thrombocytopenia and offer possible explanations to account for the effects of irradiation.

ADOLPH KATZUNG, M.D.

## LYMPH GLANDS AND LYMPHATIC VESSELS

Aboufker, P., and Dreyfuss, A. Mikulicz Disease (La maladie de Mikulicz). *Presse méd.*, Par., 1936, 44: 1139.

The first case of Mikulicz disease was reported by Mikulicz in 1888. The characteristic feature was a gradual swelling of the parotid and salivary glands with the histological picture of a lymphocyte and connective tissue infiltration which stilled and dissociated the glands. Four years later Mikulicz reported a case in more detail and more accurately. Since then, however, there has been much confusion in the description of cases and the term "Mikulicz disease" has been applied to all sorts of pyogenic inflammations and to syphilis, tuberculosis and tumors of the parotid and salivary glands.

The authors report a case of Mikulicz disease in a woman fifty-three years of age. On awakening one morning the patient noticed a marked swelling of the parotid glands. The suddenness of its appearance was unusual as the swelling is generally gradual. A month later it was less marked than at first. Fever and pain were absent, but there was an intrabuccal edema. After a week the lachrymal glands became greatly swollen. Eight months previously the patient had had an attack of facial paralysis without fever, which was accompanied by swelling of the cheek. This persisted for three days and then disappeared. The authors believe it may have been a first transitory attack of the Mikulicz disease.

As irradiation failed, diathermy was tried because of its value in other forms of cirrhosis. Two months after this treatment the parotid tumor had completely disappeared although the lachrymal glands remained swollen to a certain extent and the conjunctiva was very dry.

Histological studies showed a lymphocytic and connective tissue reaction, at first rich in cells and later of a cirrhotic nature. It was not an ordinary acute or chronic inflammation, and syphilis and tuberculosis could be excluded. Neither was it a tumor. The inflammation was a periacinous reaction analogous to an intense stroma reaction and the intense sclerosis of the gland with stiffening of the gland tissue suggested an acquired dystrophy. The condition was not a blood disease as there was no change in the blood-forming organs except a slight lymphoplasmocytic reaction in the spleen which was found to be due to a prediabetic condition possibly secondary to, but more probably independent of, the Mikulicz disease. The similarity of the structure of the parotid and lachrymal glands and spleen probably accounts for their simultaneous involvement in Mikulicz disease. Mikulicz did not study the pancreas in his cases. AUDREY GOSS MORGAN, M.D.

Warner, E. C. The Treatment of Lymphadenoma with a Sensitized Vaccine of the Elementary Bodies. *Lancet*, 1935, 231: 417.

This article reports 3 cases of lymphadenoma in which the results of treatment with Gordon's sensi-



tized vaccine from the elementary bodies supported Gordon's contention that the elementary bodies are the cause of the condition and suggested that his vaccine is a valuable curative agent. Warner discusses the general principles of the use of the vaccine and describes the mode of its administration. He states that severe reactions are produced by large doses and minor reactions by small doses. The reactions to small doses are in the nature of a temporary aggravation of the usual symptoms and signs of lymphadenoma. The fact that reactions are produced by such small doses is important. If the vaccine is given before the disease is too far advanced the symptoms and signs are greatly alleviated.

HERBERT F. THURSTON, M.D.

Ginsburg, S. Lymphosarcoma and Hodgkin's Disease. Clinical Characteristics. *Ann Int Med*, 1936 10 337

Lymphosarcoma and Hodgkin's disease most frequently manifest themselves clinically by invasion of lymph nodes and the spleen. However, their invasion is not confined to lymphoid organs and structures. They are protean diseases invading every organ and tissue of the body. Extraglandular involvement by lymphosarcoma and Hodgkin's disease is not always an extension or a metastasis from primary invasion of lymph glands or the spleen. Primary and predominant extraglandular lymphosarcoma and Hodgkin's disease have often been reported.

There are no pathognomonic clinical signs of these conditions. Hence extraglandular involvement has frequently been overlooked or mistaken for a non-neoplastic condition. Both lymphosarcoma and Hodgkin's disease are characterized not only by marked invasion, proliferation, replacement, and compression of organs and tissues but also by

necrotization, ulceration, toxemia, cachexia, and a febrile reaction. A febrile reaction especially of the relapsing type, has been noted more often in Hodgkin's disease than in lymphosarcoma, but is by no means rare in lymphosarcoma. Both diseases may run an acute, a subacute, or a chronic course. They may be differentiated only on the basis of morphologic microscopic criteria, and these are not always conclusive.

The etiology of lymphosarcoma and Hodgkin's disease still remains obscure.

There is no specific method of treatment for either condition. Chemotherapy, vaccine and toxin treatment, surgery, and irradiation are purely palliative methods but occasionally have resulted in freedom from clinical evidence of disease for many months or years. The most important physical agents in the treatment are radium and the roentgen rays. The use of these should always be combined with medical treatment.

To obtain favorable results in either disease by the methods available today the diagnosis must be made before irremediable destruction or compression of organs occurs and before widespread metastases develop. In doubtful cases in which a biopsy specimen is unobtainable the radiotherapeutic test may be of great diagnostic aid.

The clinical course, the mode of death, the results of chemotherapy, treatment with vaccines, toxins, radium, the roentgen rays and surgery, and the prognosis in both conditions are very similar. Hodgkin's disease varies in no fundamental clinical characteristics from lymphosarcoma. Whatever clinical variations may be present at times are merely variations such as may occur in any disease affecting different individuals under different constitutional and environmental conditions.

SAMUEL KARN, M.D.

# SURGICAL TECHNIQUE

## OPERATIVE SURGERY AND TECHNIQUE, POSTOPERATIVE TREATMENT

Robinson, J. M., and Spencer, J. Roentgen Therapy of Acute Postoperative Parotitis. *New England J. Med.*, 1936, 215, 150

Acute parotitis may occur after any operative procedure, but in almost all of the postoperative cases reported in the literature it followed an abdominal operation. In the authors' opinion, the close association of the condition with abdominal surgery is best explained by the theory that acute parotitis, terminal or postoperative, is usually an ascending infection of the parotid gland from the mouth which occurs as a rule in persons whose resistance has been reduced by age, disease, intercurrent infection, or the effects of a severe operation. The most constant predisposing factors are dryness of the mouth and a diminution in the flow of saliva such as follows dehydration from any cause, hyperpyrexia, the prohibition of fluids by mouth, and the administration of opiates or atropine.

The mortality depends upon the age and general condition of the patient, the type and extent of the operation, the virulence of the infecting organism, the extent of the parotitis, and the method of treatment. The time honored method of treatment consists of the application of hot or cold compresses to the swelling, followed by incision if definite evidence of fluctuation is elicited or as advocated by some surgeons, early incision even when there is no evidence of fluctuation. After this treatment the mortality is almost 50 per cent. However, at least a third of the deaths can be ascribed to causes other than the parotitis.

In 1930 Rankin and Palmer reported that in 20 cases treated with the radium pack the mortality was 20 per cent whereas in 53 cases treated in the usual way it was 30 per cent. Recently Bowing and Fricke reported a 23 per cent mortality in 185 cases treated with radium. High voltage roentgen therapy, the use of which was suggested by Holmes, has none of the disadvantages of radium therapy, is generally available, delivers a uniform, easily controlled dose throughout the swelling, and accomplishes its purpose quickly.

In the last 3 years the authors have treated 12 cases by roentgen irradiation. As a rule they direct 300 r, but occasionally 200 or 400 r, to the involved side or, if the condition is bilateral, to both sides, at 1 sitting through a 10 cm cone. The factors are a 200-kv peak, a skin focus distance of from 30 to 60 cm, filtration with 0.5 mm of copper and 1 mm of aluminum, and an effective wave length of 0.16 Angstrom units. The dose is measured without backscattering. It is approximately one half a skin-erythema dose.

In all of the cases treated by the authors a laparotomy had been performed. Of the 3 cases in which death occurred, the swelling had definitely decreased in 2 and had entirely disappeared in 1 before the patient died. The value of roentgen therapy was shown most conclusively in the cases of 4 patients with bilateral parotitis, all of whom recovered completely.

The authors report a typical case history and review all of their cases in detail.

They believe that roentgen therapy with a dose of about 300 r delivered to the lesion in 1 sitting will definitely reduce the high mortality usually associated with acute postoperative parotitis, and that the final results of this treatment are at least as satisfactory as those of irradiation with the radium pack.

HAROLD C. OCHSNER, M.D.

## ANTISEPTIC SURGERY, TREATMENT OF WOUNDS AND INFECTIONS

Laewen, A. The Question of Early Operation in Severe Burns. (Zur Frage der Frühoperation schwerer Verbrennungen). *60 Tag d. deutsch Ges. f. Chir.*, Berlin, 1936

Since Wilms in 1901 removed pieces of the burned skin and immediately transplanted new skin in cases of small third-degree burns, early operation has been performed in cases of burns by only a relatively few surgeons and dermatologists. The author cites reports of such treatment by Weidenfeld and Zumbusch in 1905, Lee in 1923, Ravdin and Ferguson in 1925, Willes in 1925, Bancroft and Rogers in 1926, Zumbusch in 1926, Mackenzie in 1927, Wels (electric burns) in 1929, Salven in 1933, Nelula in 1933, and Arzt in 1935.

The basic purpose of early removal of the burned tissue is to protect the patient from infection and from the absorption of the products of protein decomposition. That this is possible was shown by the experimental investigations of Heyde and Vogt (1913), who succeeded in keeping animals alive by cutting out the burned area. It was shown also by the investigations of Olshrycht (1924) who, on the basis of newer experiments on animals, recommended the most thorough possible removal of the burned parts to eliminate the source of the toxin formation. It was demonstrated again by the investigations of H. Seung O (1930) who, in experiments on rabbits, was able to overcome the effects of burns, even when the experimentally proved general manifestations were already apparent, by cutting out the subcutaneously scalded muscles, provided he did this before the elapse of 3 hours. Of chief importance, however, is the question whether it is possible to save human lives by cutting out the burned tissue. Next in importance is the question whether it is

possible to shorten the healing process by early removal of the burned skin in third degree burns and immediate covering of the defect. While experiences reported to date are not sufficient to answer these questions definitely, it may be said that in some of the cases recorded in the literature early operative treatment had a favorable effect and with other measures such as the infusion of blood and salt solution promoted healing. The author reports the following case:

A night watchman 51 years old who had struck his right arm and shoulder against a hot stove in a fall presented a circular burn of Grade 3 extending from the back of the hand to the axilla. The skin of the burned area was yellowish brown and brownish black and felt like leather. It was under such great tension especially on the upper arm that the radial pulse could not be detected. Nine hours after the accident Laewen removed all of the burned skin by operation. In some places the skin with the burned subcutaneous fatty tissue came off like a shell but in others it had to be dissected from the muscular tissue. The subcutaneous veins were partly thrombosed. The extensive skin defect was covered with Thiersch skin grafts which were obtained from the thighs by 2 assistants after the induction of block anesthesia of the femoral and lateral femoral cutaneous nerves. The large sections of epidermis some of which were half the size of the palm of the hand, were fixed to the substratum with silk sutures. Some of them took. The remaining defects were covered with grafts by Braun's method on the forty eighth and eightieth days.

The patient had fever for about 9 weeks. His temperature was usually about 38 degrees C. In the fifth and sixth weeks it was between 38 and 39 degrees C. After about 5 months a fairly long bone sequestrum was removed from the ulna. After 8 months of treatment the patient was discharged from the clinic with the arm entirely covered with skin, but with marked restriction of the function of the elbow and a persisting edema of the back of the hand. The mobility of the fingers had been somewhat restored.

In this serious case everything possible was achieved by the treatment. While Laewen is of course unable to say what the outcome would have been without radical early operation, he states with assurance that no viable skin was sacrificed. If the stiff shell like covering formed by the charred skin had not been removed the sloughing processes would probably have been slow and accompanied by phlegmon formation. Even if these processes had progressed without complications the transplantation of epidermis could not have been attempted until they had been completed and clean granulations had been formed. Laewen therefore believes that the healing process was shortened in spite of the long time it required. It is not known whether the early operation saved a limb that would have been lost without it but this possibility cannot be excluded.

The technic and time of early operation in cases of severe burns have varied. The author summarizes the procedures described in the literature as follows:

1. Excision of the burned skin of small third degree burns followed by irradated autotransplantation (Wilms 1901) or by suture (Lee 1923). The difficulty in this procedure lies in the fact that recognition of the limits of a fresh third degree burn of the skin is not always possible. Bancroft and Rogers state that if excision is done too early viable epithelium of hair follicles, sweat glands and fat glands may be destroyed. Therefore they recommend that the operation be delayed until the third day, when the limits of the burn will be more easily distinguished.

2. Removal of burned skin in strips by the use of the transplantation knife according to the method of Weidenfeld and Zumbusch (1903). As early as 1913 Zumbusch stated that it is possible to remove only a part of the burned tissue by this procedure. Nevertheless he was able to prolong the lives of patients with severe burns considerable and probably in a number of cases to save life by this method. According to Weidenfeld and Zumbusch the procedure is suitable particularly for cases in which from one third to one half of the skin has been burned. In 1933 Salven recommended removing the burned tissue in strips with the transplantation knife leaving narrow ridges of skin between the strips.

3. Deep excision of all of the burned tissue, followed by open treatment with tamponsade or drainage (Lee 1923), Ravdin and Ferguson (1925), Wille (1925), Bancroft and Rogers (1926), Mackenzie (1927), Salven (1933), Nekula (1933) and Arzt (1935). According to Wille who treated 36 patients, some of whom entered the hospital with toxic fever 1 or more days after the injury, the radical removal of the destroyed tissue always overcame the toxemia and hastened healing. Bancroft and Rogers stated that the effect of such treatment on the pulse, temperature and general condition was usually amazing. Mackenzie repeats the operation if necessary on the fourth or fifth day after clear demarcation has appeared. Arzt reported 7 cases of severe burns which were treated by this method at the Ranz Clinic. He said that at times, because of the location of the burn the operation is very difficult and must be limited. The procedure is suitable for cases of circumscribed but especially deep burns that is burns of the third or fourth degree. In such cases not only the skin but also the burned muscle and bone were removed. The operation was performed earliest 1 day after the burn but sometimes not until the third to sixth day. Of the 7 severe burns 4 healed satisfactorily. The only death due directly to the burn occurred on the twentieth day. The 2 other deaths were due respectively to pulmonary embolism and sepsis. In the most severe cases a blood transfusion was given.

4. Immediate resection of the destroyed tissue followed by suture or transplantation. This method has been used in cases of third degree electrical

burns (Wels, 1929). It is believed to prevent the formation of a deeply penetrating focus of infection.

5 Splitting of the burned skin by incisions like the lines on a chessboard after treatment of the wound with tannic acid in cases of beginning infection (Lee, 1923).

6 Splitting of the burned skin by extensive cross-cuts and dissecting it loose so that it will slough off. In 1931, Salven performed this operation with good results in a case of severe burn that seemed hopeless.

In conclusion Laewen says that, from a review of the results of early operations performed in cases of severe burns, it is evident that recommendation of early surgical treatment on principle is as yet impossible because experience has been insufficient. However, while it cannot yet be advised as a routine procedure, its basic rejection is not justified. The treatment should always be that which is most suitable for the given case. Recognition of the indications for operation and the choice of operative technic require experience. Of special importance is the answer to the question whether early removal of the burned tissue in conjunction, of course, with usual methods of treatment such as infusion, of blood and salt solution, will save life when it is threatened. (LAEWEN) STANLEY J. SPARGER, M.D.

Keller, W. Burns With Special Consideration of Their Treatment by the Method of Tschmarke (Ueber Verbrennungen mit besonderer Berücksichtigung der Behandlungsweise nach Tschmarke) 1935, Zurich, Dissertation.

After extensive consideration of the literature and the general clinical experiences in Zurich, the author reports his own observations concerning the history of patients with burns before they entered the hospital, the condition in which they were received at the hospital, and first aid treatment of burns. He then discusses the local and general symptoms, the healing process, the complications, and the findings at autopsy. He discusses in special detail the general and local treatment, the latter of which varies according to whether the burn is fresh or infected. Finally he reports on the prognosis, early deaths, and late deaths with the help of statistics. His discussion is based upon 224 cases which were treated in the period from 1919 to 1933, of which 51 were treated after 1927 according to the method described by Tschmarke in 1893. Tschmarke thoroughly disinfected the surrounding area, removed all shreds and contents under anesthesia, covered the extensive wound area with sterilized iodoform gauze, and over the gauze applied a thick absorbing bandage which he left in place for at least one week.

Keller believes that in suitable cases in which the preparations have been properly carried out this operative treatment is better than other methods as it is associated with a lower mortality and fewer complications, it is almost painless, and, when complications do not develop, it results in quicker healing. For successful results the burns must not be more than 24 hours old, the wounds must not have

been contaminated by first-aid treatment, and the operation must be done thoroughly and painstakingly, all dead tissue being removed. If the wounds are infected or even if infection is merely suspected, operative treatment is contra indicated because it exposes extensive wound areas to the organisms and consequently the prognosis is much less favorable than when more conservative therapy is used.

(FCCERT) STANLEY J. SPARGER, M.D.

## ANESTHESIA

Roventine, E. A., and Taylor, I. B. Postoperative Respiratory Complications: Their Occurrence Following 7,874 Anesthetics. *Am J W Sc*, 1936, 19: 807.

The authors present statistics with regard to post-operative respiratory complications which are based on 7,874 anesthetics induced by medical students, student anesthetists, interns, residents, and experienced anesthetists during a period of one year. The anesthetic agents used were ether, nitrous oxide, ethylene, tribromomethanol, and cyclopropane. The patients were examined for complications of all types by the members of the anesthesia staff before operation and after operation up to the time of their discharge from the hospital.

The nature and incidence of the chief respiratory complications regardless of the anesthetic were: slight cough (3.6 per cent), severe cough (1.1 per cent), partial pulmonary collapse (0.3 per cent), massive pulmonary collapse (0.2 per cent), pneumonia, all forms (0.7 per cent), laryngitis (1.8 per cent), and bronchitis (0.3 per cent). The mortality due to respiratory complications was 0.59 per cent (47 deaths).

The authors state that the incidence of respiratory complications after anesthesia is related to seasonal variations in the incidence of infections of the upper respiratory tract. Oral sepsis and pre-operative cough complicate convalescence. In the cases reviewed no single agent could be identified as more potent in predisposing to respiratory complications than others.

Every patient receiving an anesthetic was classified in one of the following groups:

Emergency group: Those with insufficient clinical study to determine their physical condition.

Group A: Those in excellent physical condition for minor operations.

Group B: Those in good physical condition for major operations.

Group C: Those with organic lesions from an unrelated surgical operation.

Group D: Those in poor physical condition for a serious surgical operation.

Group DD: Extremely poor surgical risks.

In serious cases, cyclopropane, ethylene, and ether in the order named were used. Two thirds of the patients were classified in Groups B and C.

The method for the induction of the anesthesia in the majority of cases was the carbon dioxide ab-

sorption technique Endotracheal anesthesia was used mainly for serious risks. Open drop ether was given for tonsillectomies performed on children.

The authors accept Guedel's classification of the stages of the anesthetic state. In many cases the depth of anesthesia obtained was influenced by the surgeon's preference. The incidence of respiratory complications was highest (12 per cent) in Plane 4 (Guedel) the deepest stage of anesthesia.

In cases of spinal anesthesia with intercostal paralysis the incidence of pulmonary complications was 11 per cent whereas after simple subarachnoid block it was 4 per cent.

Respiratory complications were less frequent after anesthetics induced by experienced anesthesiologists than after those induced by students and interns. After surgical operations requiring from one to one and one half hours the incidence of such complications was twice as high as after operations requiring less than one hour and after operations requiring two hours it was 3 times as high as after operations requiring one hour.

BENJAMIN G. P. SHAFER, M.D.

Massart R. Basal Anesthetics (Les anesthésies de base). *Bull. et mem. Soc. d' chirurgiens de Paris* 1935 28 247.

Among the drugs which have been used for basal anesthesia are scopolamine, atropine, tribromethanol, cyanide, amylal, nembutal and picrotoxin. The

author reports his experiences in 300 cases in which tribromethanol or avertin was employed. This has been the anesthetic of choice for about 90 per cent of his operations. In order to prevent errors in dosage he has devised a special chart on which all of the necessary data pertaining to the condition of the patient are recorded and from which the dosage can be calculated. The amount of tribromethanol given has ranged from 60 to 120 mgm. per kilogram of body weight. In about half of the cases it has ranged from 80 to 90 mgm. The author discusses in detail the various factors which must be considered in determining the dosage. He emphasizes the importance of careful observation of the blood pressure during the anesthesia. At the beginning of the anesthesia the blood pressure shows a slight increase but as soon as the operation is begun it decreases again, doubtless because of the bleeding. Thereafter it should remain constant. Any further decrease is to be regarded with concern.

The chief advantages of the use of a basal anesthetic are relief of anxiety on the part of the patient, the ability of the surgeon to extend the length of time of the operation without increasing the risk and apparent lessening of postoperative complications such as nausea and vomiting. In the author's experience an unfavorable incident has occurred only once. This was respiratory collapse at the end of an operation which responded readily to stimulation.

NATHAN A. WOMACK, M.D.

# PHYSICO-CHEMICAL METHODS IN SURGERY

## ROENTGENOLOGY

Hampton, A. O., and King, D. S. The Middle Lobe of the Right Lung Its Roentgen Appearance in Health and Disease *Am J Roentgenol*, 1936, 35 721

This article is based on a study of fifty-six patients suffering from disease of the middle lobe of the right lung. In forty one of them the findings were checked either by surgery or autopsy and in the remaining by bronchoscopy or lipiodol injections. The purpose of the study was to aid in the interpretation of certain shadows seen in the lower portion of the right side of the chest which are now commonly attributed to conditions vaguely termed right perihilar thickening, peribronchial fibrosis, right hilar tuberculosis, pleuropneumonia, disease, thickening of the interlobar pleura, pleurisy at the anterior costophrenic angle with interlobar extension, increased lung markings, diminished radiance, mottled dullness, and most frequently, interlobar effusion.

The report is divided into three parts. Part 1 includes a brief description of the anatomy of the normal lung and of some of the more common shadows cast by disease in the middle lobe. Part 2 deals with shadows suggesting encapsulated interlobar empyema and emphasizes certain factors of importance in differential diagnosis. In Part 3 some of the more unusual shadows cast by a fibrosed or collapsed middle lobe are described. The effect of pleural adhesions upon the shape of these shadows is discussed and the roentgen observations are correlated with the clinical or autopsy data. The value of lateral roentgenograms is emphasized.

It was established that in the lateral projections of the chest, consolidation of the lateral aspect of the middle lobe casts a triangular shadow, whereas consolidation of the medial portion may cast a rectangular shadow. Consolidation may produce also convexities of the middle lobe septa suggesting encapsulated fluid under pressure.

The fusiform and overlapping shadows commonly attributed to interlobar effusion are discussed, and it is emphasized that shadows heretofore interpreted as due to interlobar effusions are due more commonly to disease within the middle lobe. The authors state that interlobar extensions of pleural fluid and thickening of interlobar septa are not infrequent, but primary encapsulated interlobar empyema in the region of the middle lobe is thought to be rare.

Visualization of normal pulmonary septa is common. Thickening of the septa is believed to be due to pleural disease. Shadows suggesting thickened interlobar pleura are often cast by disease in the middle lobe. The importance of displacement of visible interlobar septa in determining the degree

of lobar collapse or destruction is emphasized. Attention is called to the fact that shadows suggesting interlobar disease must occupy the normal position of the septa.

The size, shape, and position of a contracted middle lobe is markedly influenced not only by surrounding disease but also by pleural adhesions.

In conclusion the authors say that although certain suppurative diseases of the middle lobe can be accurately diagnosed by roentgen examination alone, the importance of bronchoscopic and lipiodol examinations before surgical procedures is obvious.

ADOLPH HARTUNG, M.D.

Gatti Casazza, A., and Mucchi, L. Roentgenological Studies of Mesenteritis (Studio radiologico delle mesenteriti) *Radiol med*, 1936, 23 485

Mesenteritis may be circumscribed or diffuse. In the circumscribed variety plaques appear on the mesentery. These usually are round or stellate, grayish white or of a mother-of-pearl aspect, shining and fibrous, and often contract to umbilicate the mesentery. In the diffuse variety the mesentery appears retracted, rigid, only very slightly mobile, and definitely fibrous and thickened. In the later stages the involvement of the blood vessels and lymph vessels may lead to edema. Histologically the 2 forms are identical. In the early stages there is an exudative inflammation, usually serofibrinous but occasionally hemorrhagicopurulent. Later there is a rich development of perivascular connective tissue with an increase of the connective tissue of the mesentery, both of which subsequently contract in form scar tissue. The walls of the blood and lymph vessels become definitely thickened. Occasionally the nerves become dissociated, often with destruction of fibers.

In a review of the literature the authors found that the condition has been produced experimentally by many different procedures. In dogs it has been produced by the subserous injection into the mesentery of a 0.5 per cent solution of sodium bicarbonate, non virulent colon bacilli, and tuberculosis toxin. Also in dogs section of the nerves in the mesentery has resulted in atonic dilatation of the corresponding segment of the intestine which could be demonstrated with the x ray. Injection of various substances along the neurovascular bundle and trauma producing a hematoma in this region both caused a compression of the nerves with a resulting segmental dilatation in the zone of altered mesentery which became roentgenologically demonstrable in from 5 to 7 days. Local injection of extract of the ascari worm also produced the lesion. Local retractile mesenteritis has been caused by ligation of small veins, whereas similar ligation of the corresponding

small artery failed to produce it. The injection of dilute sodium salicylate into the vein resulted in the characteristic lesion of the mesentery without changes in the vein wall thus reproducing very accurately the clinical picture in which gross changes in the blood vessel walls are absent. Ligation of the lymph drainage of an intestinal loop also resulted in thickening and the development of opacities in the layers of the mesentery.

The authors produced the lesions by traumatizing the neurovascular ramifications of a loop of intestine. Within from 6 to 8 days the corresponding loop was dilated. They were able to demonstrate the lesion by roentgenography.

Clinically, mesenteritis is manifested principally by pain. The pain may occur at any time, but is usually independent of the ingestion of food. As a rule it is prolonged and of uniform intensity. Only very rarely is it colicky. It is not influenced by the ordinary medication nor by changes in the position of the body. It is usually diffuse over the entire abdomen but in some cases is localized in the umbilical region or the right lower quadrant of the abdomen. Occasionally it radiates to the right loin or the external genitals. Frequently it is accompanied by vomiting. Alternating diarrhea and constipation are common. Fever is rare. The course is progressive. Inspection of the abdomen is usually negative but occasionally gaseous distention, tumor, fluctuation and the outline of intestinal loops are observed. Complications are rare. They are of the nature of intestinal obstruction or pseudo obstruction.

The roentgen evidence of the condition varies. The classical signs of atonic segmentary dilatation secondary to the mesenteritis which were described by Vespignani indicate that the changes are usually multiple. However even when the involvement of the mesentery is marked only a small portion of the intestine may show the signs. As a rule the dilatation is of a uniform grade. Stenosis is absent. Flattening of the valvular markings is constant, and there is a definite motor insufficiency of the involved portion of intestine.

The authors describe the technic of x-ray examination for mesenteritis and then report 34 cases. Of 3,000 examinations the condition was found in only 20. In the reviewed cases atony of the bowel was more common than dystony. Often the loop was involved to an extent of from 10 to 25 cm and had a tubular aspect. Gas in discrete amounts flattening of the walls and adhesion of the barium to the walls were observed. Flattening of the valvular convergences of the jejunum was relatively rare. The absence of signs of an anatomic stenosis associated with the dilated loop is of prime importance. The authors were unable to note any characteristic changes in the mucosal markings. Retardation of the passage of the contents through the jejunum and ileum was of great importance. In cases in which the mesenteritis is secondary to some other lesion of the gastro-intestinal tract, an association which is com-

mon, recognition of the mesenteritis is difficult because its manifestations are often obscured by the signs of the primary lesion. Of interest is the fact that fibrous mesenteritis has not been noted in conjunction with tuberculosis of the mesenteric glands.

A. LOUIS ROSE, M.D.

Hunter, F. T. Spray X-Ray Therapy in Polycythemia Vera and in Erythroblastic Anemia. *New England J. Med.* 1936, 214, 1123.

The author believes that spray x-ray therapy is the treatment of choice for polycythemia vera as it has a prolonged depressant effect on the blood-forming organs, produces no disturbing clinical symptoms and may be given without interrupting the patient's daily work. He reports two cases.

In the first case the red cell count was 8,500,000, the hemoglobin (Sahli) 125 per cent and the white cell count 12,000. A total of 904 r divided into two series with eleven sittings in the first and twenty-six sittings in the second was given. With a distance of 215 cm. filtration with 0.5 mm. of copper and 4.0 mm. of celluloid 4 ma. and 200 kv. 20 r per hour (measured in air) were delivered. During a follow-up period of three years the erythrocyte and leucocyte counts have remained within approximately normal limits.

In the second case that of a patient with polycythemia vera duodenal ulcer, inactive pulmonary tuberculosis and an enlarged spleen, an abdominal mass had been treated by high voltage x-ray irradiation. After a few months the patient's color was a deeper red than previously, the erythrocyte count 11,565,000 and the hemoglobin (Sahli) 150 per cent. A total of 1,192 r was given in twenty-two sittings. Approximately 54 r were given per hour. Later 120 r additional were given in six sittings. During a follow-up period of three years the erythrocyte and leucocyte count have remained much lower and the patient has felt perfectly well. The spleen has decreased in size. The author reports also a case of erythroblastic anemia (Cooley) in which spray therapy produced favorable changes in the blood picture and clinical improvement. However, it is too early to determine the end results as the patient has been followed for only five months.

Hunter warns against giving the x-ray irradiation too rapidly.

F. A. E. BARTH, M.D.

Joul J. The Protracted Fractional Roentgen Treatment of Malignant Tumors ad modum Coutard. *Acta radiol.* 1936, 17, 209.

As generally used the Coutard method of irradiation is irradiation with roentgen rays of low intensity given daily or twice daily in relatively small doses (fractionated) over a period of at least 3 or 4 weeks. Clinical observation of the biologic reactions produced by it is of the greatest importance. In some places the protraction factor has been disregarded and the irradiation has been carried out with high intensity. In others the treatment has been continued for only 2 or 3 weeks. There is a

difference of opinion also as to whether a definite physical quantity should be administered to a given tumor within a definite length of time or whether the total dose may be estimated from the clinical tissue reaction. It is evident, therefore, that the method is still in the process of evolution.

Since February 1931 the author has employed the Coutard method in 121 cases of malignant epithelial tumors of the upper air passages, 73 of such tumors of the oral cavity, and a few of such tumors at other sites. In a number of the cases of tumor of the oral cavity supplementary treatment with radium or electrosurgery was given. In a follow up investigation made in 1936 it was found that of the patients treated for tumor of the upper air passages, 31 per cent, and of those treated for tumor of the oral cavity, 24 per cent, are still free from symptoms after from 1 to 5 years. Of the former, 31 per cent are free from symptoms after 1 year, 31 per cent after 2 years, 25 per cent after 3 years, and 27 per cent after 4 years.

The factors in the technique employed were from 165 to 185 kV, a Thoraeus filter, corresponding to a half value layer of about 1.5 mm of copper, an intensity of from 2.5 to 5 r per minute, a skin target distance of from 50 to 70 cm, and fields measuring from 45 to 150 sq cm and averaging from 80 to 112 sq cm. One treatment was given in the forenoon and 1 in the afternoon. The daily dose ranged from 50 to 300 r (measured in air) and averaged from 150 to 240 r. The dose per seance therefore ranged from 75 to 120 r. The duration of the series ranged from 3 to 12 weeks but in the average case was about 6 weeks. The corresponding total dose on all fields together ranged from 4,000 to 9,000 r and averaged from 6,000 to 7,000 r.

The author discusses in detail the various clinical reactions in the tumors, the mucous membranes, the skin and the body as a whole, and arrives at the conclusion that it is best to keep all reactions moderate by extending the irradiation over as long a period as is compatible with adequate treatment.

T LELAND M.D.

Downs, F. E. Lung Changes Subsequent to Irradiation in Cancer of the Breast. *Am J Roentgenol* 1936, 36 61.

In order to obtain additional information relative to the importance of changes in normal lungs following irradiation, the author reviewed the autopsy findings in 70 cases of cancer of the breast, in fifty three of which some form of irradiation of the chest had been given. Eleven of the subjects had been

treated with both the roentgen rays and radium, thirty two with roentgen rays alone, and six with radium alone. A large number had been operated upon and had received various types of irradiation. Nineteen roentgen laboratories had contributed to the treatment. This fact is mentioned to justify the assumption that the cases represent a fair cross section of the cases of breast irradiation in the locality. A few of the patients had been treated with the roentgen rays infrequently for a period of from eighteen to thirty months. Others had received intensive irradiation over short periods. The filtration varied from 4 mm of aluminum to 2 mm of copper and 1 mm of aluminum. Six patients received from 10,000 to 22,680 mgm hr of irradiation from radium in platinum needles. At least seven received an amount approximating 7,000 r, and four more than 10,000 r to the chest wall.

The study of roentgenograms and of macroscopic and microscopic sections revealed two distinct processes in the chests of patients treated for breast cancer by irradiation: (1) transient lung changes and (2) permanent lung changes. The former are of the nature of an acute pneumonic reaction which occurs during the course of the irradiation, subsides in three or four months, and entirely disappears within a year. Permanent secondary fibrosis rarely follows unless the lungs were vulnerable at the time the therapy was instituted.

Permanent lung changes in the nature of a fibrosis attributable directly to irradiation were found by the author only in a case in which radium had been implanted deeply in the axilla at the time of amputation of the breast. Examination disclosed necrosis of the ribs, thickening of the pleura, and a peripheral fibrosis of the lung which was adherent to the chest wall. No roentgen therapy had been given.

There were numerous cases in which fibrosis was found associated with metastases or tuberculosis. In some of these the fibrosis was believed to be an irradiation fibrosis until careful histological studies including many sections were made of the lungs at autopsy. The cause of the fibrosis was not evident macroscopically. The fibrosis seen in the metastases is so similar in some instances to that found in tuberculosis that differentiation is possible only by microscopic study. This similarity of appearance is explained on the basis of identity of the mechanism of invasion. The author concludes that any condition which leaves the lymphatics in a vulnerable condition may lead to fibrosis if the lungs are irradiated, and that normal lungs are rarely affected in this manner.

ADOLPH HARTUNG, M.D.



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AOULPH HARTUNG, M. D.

## MISCELLANEOUS

### CLINICAL ENTITIES—GENERAL PHYSIOLOGICAL CONDITIONS

Hinton J W Allergy as an Explanation of Dehiscence of a Wound and Incisional Hernia  
*Arch Surg*, 1936 33 197

Hinton says that wound dehiscence is probably a more advanced stage of the process which is responsible for incisional hernia and for the recurrence of inguinal hernia after the many different methods of repair.

A clearer conception of the condition may be obtained by classifying it into three stages.

The first stage is complete separation of the peritoneum and the posterior sheath of the rectus abdominis muscle. In cases in which this occurs the wound heals by primary union except for a slight serosanguineous discharge between the fifth and eighth days and if it is not strapped an incisional hernia is likely to form.

In the second stage there is complete separation of the entire abdominal layers without visceral protrusion.

The third stage consists of complete separation of the layers with the protrusion of an abdominal viscus. In 621 laparotomies reviewed the incidence of wound dehiscence was 3.05 per cent.

The mortality of the condition reported by various surgeons has ranged from 16 to 44 per cent. In the cases reviewed by the author it was 16.7 per cent. The deaths were due to diffuse peritonitis.

Early diagnosis is essential. The one diagnostic feature is a serous or serosanguineous discharge from the wound.

Numerous methods of wound closure have been tried and discontinued. Today through and through sutures of heavy silk or dermal suture are used and removed after from seven to nine days. This method of closure was employed by Price for over fifty years, and his associate, Kennedy, has continued to use it. In none of the cases of these surgeons has it been followed by dehiscence.

Because of the high incidence of wound dehiscence in various conditions it seems reasonable to assume that a certain percentage of the patients in whom it occurs may be allergic to catgut.

In support of this theory the author reports studies in which he and Spain gave intradermal injections of a solution of fresh sheep gut in 112 selected cases. In 9 cases a definite reaction occurred within from ten to fifteen minutes.

Since wound dehiscence may be due to an allergic condition, it seems better to Hinton to adopt the technique of through and through suture for wound closure rather than try to detect patients who are sensitive to sheep protein.

WILLIAM E. SHACKLETON M.D.

Parreira, H Tumors of the Skin Glands (Sobre tumores das glândulas cutâneas) *Arq de patol*  
1935 7 244

In a histologic study of 1,284 tumors of the skin collected from the Portuguese Institute of Oncology and the First Surgical Clinic of the Faculty of Medicine of Lisbon Parreira found 3 neoplasms which had developed from the sweat glands, 78 which had developed from the sebaceous glands, and 3 which had developed from glands of both types. The article is illustrated with photographs of the patients and photomicrographs of the tumors.

After reviewing the embryology and histology of the sebaceous and sweat glands the author discusses the hyperplastic, adenomatous and carcinomatous forms of tumors and a group of lesions classified as transition or precancerous forms which occur in these glands. In his discussion of each type of tumor he reviews the literature and reports illustrative cases giving the histologic findings, treatment, and results. In a general discussion of the pathological anatomy of tumors of the skin glands he expresses the opinion that many epitheliomas of the skin originate from the glands, more frequently from the sebaceous glands than from the sweat glands.

AUDREY GOSS MORGAN M.D.

Murray W S and Little G C Extrachromosomal Influence in Relation to the Incidence of Mammary and Non Mammary Tumors in Mice *Am J Cancer* 1936, 47 516

The authors state that it has been known for some years that in mice the tendency to develop cancerous growths is inherited but the mode of inheritance has been the subject of much discussion, the hypotheses ranging from the theory that this tendency is transmitted as a simple mendelian recessive (as postulated by Slye) to the theory of Lynch and others that it is transmitted as a mendelian dominant and is dependent upon a number of genes for its manifestation.

Much of the controversy has been due to two basic faults in the experimental work (1) the use of animals of insufficiently pure strains, and (2) a tendency of experimenters to combine in tabulation all of the types of neoplasia which occurred.

Several years ago two strains of mice which were sufficiently pure for such experimental studies were available to the authors. In one of these the dilute brown strain, mammary tumors were developing in from 80 to 90 per cent of the breeding females after twenty or more years of inbreeding. In the other the C57 black, no mammary tumors had developed in ten years of inbreeding.

In an attempt to determine how the tendency to develop mammary tumors is inherited these two stocks were crossed. To take care of all possibilities,

reciprocal crosses were made. That is, dilute brown females were mated with black males and black females bred to dilute brown males.

From the results of these experiments the authors came to the conclusion that the inheritance of the tendency to develop mammary tumors is not transmitted entirely through the chromosomes and that therefore it is a mistake to say that the tendency is transmitted as a mendelian dominant or as a recessive, in the ordinary sense of these terms. The fallacy of grouping all neoplasms occurring in crosses of this sort in tabulations made to prove either the dominant or recessive hypothesis is evidenced also by the behavior of the non mammary types of tumors found in such hybrids.

The data at hand indicate that mammary tumors of epithelial origin are transmitted largely by extra-chromosomal influences. Some other types of tumors do not follow this law. JOHN H. GARLOCK, M.D.

### GENERAL BACTERIAL, PROTOZOAN, AND PARASITIC INFECTIONS

Altmeier, W. A. Postanginal Sepsis. *Ann Surg.*, 1936, 104, 212.

Many cases of postanginal jugular thrombophlebitis with sepsis have been recorded during the past decade, most of them in the German literature.

The author reports a case of the condition in a colored woman twenty four years of age. The patient was admitted to Iglauer's service at the Cincinnati General Hospital September 8, 1933, complaining of right sided sore throat of five days' duration associated with dysphagia. The findings of general examination were essentially negative except for a large peritonsillar abscess on the right side. This was drained. Cultures yielded no growth. The patient's condition became progressively worse. On September 16 the right internal jugular vein was found filled with a thick, creamy, putrid pus above a large thrombus at the level of the omohyoid. The vein was ligated below the thrombus and the vein opened longitudinally and packed. Cultures were negative, but stained smears showed intracellular gram negative bacilli. Cultures under special conditions yielded an anaerobic, hemolytic, gram negative bacillus in pure culture.

After the operation the patient had numerous chills followed by the occurrence of a systolic mitral murmur. Abscesses then developed in several joints. Finally, anaerobic blood cultures, after incubation for six days, yielded a pure culture of an anaerobic hemophilic bacillus. Just before death a blood culture showed the anaerobic bacillus and a hemolytic streptococcus.

Blood transfusions were of no avail. The anemia became worse and the patient died October 24.

The cultural and autopsy findings are reported in detail and the identification of the gram negative, pleomorphic hemophilic hemolytic organism which was believed to be the primary cause of the condition is discussed. CARL R. STEINKE, M.D.

Wohlwill, F. Anatomopathologische Beiträge zum Problem der Septicämien (Contribuições anatomopatológicas para o problema das septicémias). *Arq de patol.* 1935, 7, 153.

The first part of this article is an analysis of the laws of dissemination of septic infections which shows that the laws controlling the distribution of the bacteria and the metastases caused by them are by no means purely mechanical.

The examinations made by the author led to an extension of Schottmueller's statement that sepsis exists "when there is formed within the body, a focus from which pathogenic bacteria enter the circulation constantly or intermittently to such an extent that subjective and objective signs of disease are caused by the invasion." It was found that the bacteria thrown from such a focus of developing sepsis into the circulation do not necessarily enter the capillaries of the nearest circulatory system but are retained in considerable numbers in the organs so that those remaining in the blood are not sufficient for the production of further metastases.

A classification is made into "angiodendron rubrum," the vessel system containing arterial blood which extends from the lungs through the left heart to the organs of the body, an "angiodendron coeruleum," the vascular tree carrying venous blood which extends from the organs of the body through the right heart to the lungs, and an "angiodendron hepaticum," which passes from the intestines through the portal vein to the liver capillaries. As a general rule metastases pass from one of these systems to another only after a secondary focus has developed in the beginning part of the latter system in the form of a thrombophlebitis of the lung veins, a peripheral vein, or the liver veins. Exceptions to this rule occur in cases in which there is an abnormal connection between the right and left auricles (open foramen ovale) or between the portal vein and the inferior vena cava (open ductus venosus), particularly in newborn infants.

The development of metastases depends not only on the number of bacteria passing through the capillaries but also on the peculiar organ affinities of the micro organisms and special individual characteristics of the organs affected (points of least resistance). These facts are to a certain extent of practical importance because, after the formation of a secondary septic focus in the lung veins, ligation of the veins first affected is of no avail. Therefore greater attention must be paid to the development of lung abscesses in the course of a sepsis so that they may be treated to prevent the development of the very dangerous secondary septic focus.

The second part of the article reports a study of the modifications that occur in sepsis when it affects the undeveloped fetus in the mother's body. The mechanism of development of septic infection in the fetus is first discussed, a distinction being made between septic infections transmitted from the mother to the fetus and those which develop primarily in the fetus.

The fetus is relatively well protected against septic infections of the mother by humoral protective bodies passed to it from the mother. Septic infections developing primarily in the fetus may be caused by direct infection of the fetus, direct infection of the placenta, or secondary contamination by infected amniotic fluid or infection from the wall of the uterus. Under these conditions the child is not protected. The complicated mechanism of defense is not present from the beginning, either in the history of the individual or in that of the race.

Study of the development of infection in the intra-uterine life of human fetuses and experimental work on guinea pigs has shown that there is complete anergy to inflammatory irritations in the mammalian organism only in the very first stages of development. Very soon a histiocytic reaction manifested by swelling occurs, and finally detachment from their tissue connections of different kinds of mesenchymal cells, followed by phagocytosis.

Migration of granulocytes and microphagocytosis do not occur until the second half of pregnancy. These are at first slight and develop so sluggishly that there is practically no defense reaction against general infection even in the second half of pregnancy. Even at the end of pregnancy and in early extra-uterine life the normal adult condition is not attained.

The mobilization of granulocytes seems to be dependent on preliminary work on the part of the reticulo-endothelial cells.

In animal experiments considerable differences are noted between the reactions to chemical and bacterial irritations. Inflammatory reactions to the latter occur later and are less marked than those to the former.

Lack of protection of the fetus against the general infection mentioned is explained by absence or in-

sufficiency of granulocytic defense. Under such conditions an almost unlimited increase of the bacteria takes place. Metastatic suppurations do not occur, and phlebotic foci of sepsis cannot be demonstrated. When the topographical conditions permit it, the mother's granulocytes migrate to the fetus and protect it. This results in the occurrence of a very peculiar form of intravillous placentitis, formerly not understood, in which the chorionic villi are flooded with bacteria from the fetal circulation and maternal leukocyte. In this way bacteria from the fetus may enter the mother's circulation and the fetus may become a septic focus for the mother. It is then necessary to remove the fetus and placenta as quickly as possible.

The third part of the article discusses the findings at autopsy on a pair of newborn female twins. Both of the sisters died on the second day after birth of sepsis, which was probably acquired during intra-uterine life or during delivery and originated in a congenital pneumonia. In both streptococci and staphylococci were found in cultures of the heart's blood, in the lungs and the marrow of the vertebrae. One of the sisters showed abscesses in one lung, a severe perivascular lymphangitis of the lungs, thrombophlebitis of the jugular veins and histologically demonstrable foci in the liver, spleen, kidneys and tonsils, some of them with phagocytosis of bacteria. Extensive accumulations of eosinophils in Glisson's triangles in the liver, and foci of hemorrhage in the connective tissue of the kidney hilus. Though the lesions in the other twin were much less severe, both infants died almost at the same time. Therefore the second twin apparently had less capacity for defense. In discussing the possible explanations of this difference the author suggests that it may have been due to exogenous factors or to genotypic constitutional factors.

AUDREY Goss, MORRIS M. D.

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## SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS

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FEBRUARY, 1937

# International Abstract of Surgery

*Supplementary to*  
Surgery, Gynecology and Obstetrics

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# INTERNATIONAL ABSTRACT OF SURGERY

FEBRUARY, 1937

## ABSTRACTS OF CURRENT LITERATURE

### SURGERY OF THE HEAD AND NECK

#### HEAD

Costen, J. B. Neuralgias and Ear Symptoms Associated with Disturbed Function of the Temporomandibular Joint. *J Am U Ass*, 1936, 107 352

Costen reports his findings in 125 cases of a syndrome associated with damage to the mandibular joint due to pressure from unilateral loss of molar tooth support. He found that ear symptoms predominate in patients with edentulous mouths whose symptoms develop slowly as the result of pressure on the eustachian tubes, and that pain, with or without herpes of the external canal and buccal mucosa, predominates in cases of natural malocclusion or malocclusion from loss of molar support on 1 side only. Of the patients studied, 89 were more than 40 years of age and the largest group were between the ages of 50 and 60 years.

The ear symptoms were an intermittent or continuous impairment of hearing, a "stopped up" sensation in the ears, tinnitus, a snapping noise during mastication, a dull or "drawing" pain within the ears, and dizziness with nystagmus. The pain and irritative symptoms were headache about the vertex and occiput and behind the ears, a burning sensation in the throat, the tongue, and the side of the nose, dryness of the mouth with almost total absence of saliva or, rarely, excessive saliva, and occasional herpes of the external ear canal and buccal mucosa which was most marked on the edentulous side.

When molar teeth are missing or the vertical dimension of the jaw is abnormally reduced by shrinkage of the alveolar ridge beneath plates or by grinding away of the natural teeth the mandibular joint assumes an unaccustomed burden and much of its structure is destroyed.

In the reviewed cases the most common symptom was headache. Sixty three of the patients had a daily headache. The distribution of pain was quite typical of posterior sinus disease. Anatomical causes suggested for the pain were (1) erosion of the bone of the glenoid fossa and impaction of the condyles

against the thio bone separating them from the dura, (2) irritation, by the uncontrolled movement of the condyles backward or mesially, of the auriculotemporal nerve which is distributed over the temporal and vertex region, and (3) irritation by the condyle of the chorda tympani nerve where it emerges from the tympanic plate at the mesial edge of the glenoid fossa.

Twenty two of the patients complained of pain and sensory disturbances about the lateral pharyngeal wall and in the tongue. The evidence is convincing that malocclusion and destruction of the mandibular joint play an important part in the causation of glossopharyngeal neuralgia through irritation of the auriculotemporal and chorda tympani nerves acting reflexly on the lingual and glossopharyngeal nerves. In 18 of the 22 cases of burning tongue this disturbance was completely relieved by reposition of the jaw. Herpes and salivary disturbances appear to be irritative phenomena associated with the pain.

On x ray examination, erosion of the head of the condyle on its anterior surface and to a less extent on the articular eminence is the usual finding.

The vertical dimension of the jaw is corrected and the pressure on the joint relieved by having the patient wear thin cork disks between the molar teeth on the affected side for a period of from 2 days to 1 week. The results of reposition of the jaw were generally good except in a few cases of malocclusion of natural teeth. However in the cases showing the best results the correction was done in several stages, the vertical dimension of the jaw being increased slowly.

ROBERT H. IVE, M.D.

Fig. F A The Treatment of Angioma of the Face  
*Arch Otolaryngol*, 1936, 24 271

The most effective procedures for the treatment of hemangioma of the face are, in the order of their usefulness, radium irradiation, electrocoagulation, excision, and the injection of sclerosing substances. Ligation of the afferent vessels and various plastic procedures are frequently carried out to supplement these measures. The application of carbon dioxide

snow, electrodesiccation, cauterization, the introduction of subcutaneous sutures, roentgen therapy, ultraviolet irradiation, and the application of colloidion have a much more limited field. While the results obtainable with these forms of treatment vary greatly, the choice of therapy is usually determined largely by the experience of the clinician with any one or group of them.

At present, radium is generally considered the most effective agent for dealing with hemangioma, especially hemangioma of the face. The use of radium spread rapidly as it yielded results far superior to those obtained with other therapeutic measures. At the Mayo Clinic this form of therapy was used almost exclusively in the treatment of hemangioma from the time of its introduction in 1913 until 1924 when electrocoagulation was first employed. No other agent or procedure used there has given as satisfactory results in the treatment of angioma in children. However electrocoagulation has largely supplanted radium therapy in the treatment of cavernous angioma in adults as such a tumor can usually be shrunken or scarred down more rapidly by electrocoagulation and therefore fewer treatments are required.

In the treatment of angioma radium may be employed (1) in a surface pack with distance and screening (2) in a plaque or in tubes applied directly to the surface of the lesion and (3) in needles or as radon seeds implanted into the tumor.

At the Mayo Clinic, young children with a cavernous angioma on the face measuring several centimeters or more in diameter are usually treated with radium packs. The dose ranges from 2,000 to 3,000 mgm. hr. and the treatment is repeated at intervals of from 3 to 4 months. The number of treatments depends on the response. In the cases of adults, similar lesions of the face can usually be taken care of more satisfactorily by electrocoagulation or excision with or without ligation of the efferent and the afferent vessels. In addition radium needles or small tubes containing small amounts of radium are inserted directly into the tumor through a short incision in the adjacent normal skin along the skin folds. As a rule 10 mgm. needles of radium element are used and from 1 to 6 or more are implanted for period of several hours depending upon the situation and extent of the growth and whether or not it has been treated previously. This procedure is carried out under strict asepsis as secondary infection greatly increases the severity of the reaction.

When a radium plaque is used it contains from 3 to 25 mgm. of radium element. The plaque is most effective in the treatment of capillary angioma. Covered with a rubber finger cot it is kept moving constantly and uniformly over the surface of the angioma for from several minutes to an hour or longer, depending upon the size of the lesion, the intensity of the discoloration and whether treatment has been given previously.

Electrocoagulation has greatly improved the results of treating cavernous angioma in adults.

Often the growth can be eradicated by this method with comparatively little scarring, whereas repeated applications of radium when the patient is mature frequently accomplish little. A special electrode which was devised at the Clinic is used. It consists of a rigid steel wire several centimeters in length, sharpened at one end and insulated except for about 3 mm. at its sharpened end, with vulcanite, denco cement or some other non conductor of electricity. This is thrust into the deeper portion of the tumor directly through the overlying skin. The current is then applied and the desired degree of electrocoagulation is carried out. The chief difficulty is in gauging the intensity and the extent of the coagulating process. Usually a slight change in the color of the tumor over an area adjacent to the electrode from the normal blue or violet blue to a somewhat lighter shade indicates a sufficient degree of coagulation. However when a tumor has been treated previously especially by irradiation this change is not reliable and sloughing may follow what has appeared to be only moderately intensive therapy.

While surgical excision has been supplanted to a great extent by radium therapy and electrocoagulation in the treatment of angioma of the face, in certain cases hemangioma can be dealt with more satisfactorily by surgical excision. This is true especially in many cases of capillary angioma particularly cases of portwine stain which have been treated unsuccessfully with radium.

At the Mayo Clinic epitheliomas which have developed in the dense scar left by radium treatment of a capillary angioma or a mixed capillary and cavernous angioma have frequently been observed. Often it has been necessary to remove the malignant area immediately and widely and to delay consideration of the remnant of the angioma until later. Excision by cautery or thorough electrocoagulation of the area of activity has usually been carried out.

The injection of a sclerosing substance is becoming increasingly popular in the treatment of angiomas and in the course of time will probably supplant some of the older methods of therapy.

Ohngren G. Woodman M. Patterson N. Allchin F. M. and Others Discussion of Malignant Disease of the Upper Jaw *Proc Roy Soc Med Lond* 1936 29 1497

OHNGREN said that those who treat malignant tumors in the maxillo ethmoidal region experience so many disappointments that they finally become willing to accept any method of treatment that seems to be followed by fewer recurrences than other methods, even though it may present great technical difficulties. In the course of time they become also less inclined to attach much importance to the aesthetic aspect of the results.

He reported that he has abandoned the usual operation with knife and scissors in favor of endothermy in spite of the great inconveniences associated with the latter. Among these inconveniences are the prolonged course of healing the objection

able odor, and the tendency toward late hemorrhage. Among the advantages are the possibility of treating cases that are not suitable for resection because of the extent of the disease, the mildness of post-operative shock, a low postoperative mortality, and the fact that the heat developed can kill the tumor cells even at some depth below the coagulated tissue surface.

In preparation for electro endothermy the infection in the oral cavity should be decreased by removing decayed teeth and cleansing the tonsils of infective secretion so far as possible. If the blood sugar is too high it should be reduced to the normal.

The endothermy has been carried out partly under regional anesthesia and partly under general narcosis induced either by intravenous injections of evipan or with chloroform. If the tumor involves the antrum and the ethmoid, the external carotid artery is ligated above the point of origin of the superior thyroid artery. Ligation with catgut is not always reliable because of the strong pressure caused by the pulsation in the artery. During the endothermy treatment it is important to avoid touching the tumor before the cells have been killed by coagulation. The entire tumor should be removed at one time. For coagulation at the cribriform plate, in the nasopharynx, and in the sphenoid, wide opening of the operative field is necessary. Öhngren uses an incision which passes along the median line of the upper lip into the nostril on the affected side, and thence subcutaneously along the pyriform aperture and in the gingival fold to the last molar tooth.

In cases of tumor of the antrum endothermy must be adapted to the way in which the tumor has attacked the different walls of the antrum. After freeing the skin of the face from the anterior wall of the maxillary sinus, Öhngren exposes the wall to intense heating before opening the antrum from the canine fossa. With one electrode in the antrum and the other in the nasal cavity, the tumor and the mucous membrane of the walls are cooked and scraped away so that the underlying bone is exposed. In all cases the anterior and the medial walls of the maxillary cavity are completely removed in order to permit inspection of the exposed bone in the remaining inferior, posterior, and superior walls.

The frequency with which, in past years, tumors of the antrum have recurred in the region of the pterygoid process and in the nasopharynx directed attention to the lymphatic vessels. It seems to be of great importance to destroy these by coagulation in every case of tumor in the antrum and the ethmoid. If the bone of the floor of the antrum is broken through, Öhngren cooks and removes the whole hard palate. If possible, the soft palate is left. If the bone of the orbital floor is destroyed and the tumor shows advanced growth into the orbit, no attempt is made to preserve the eye; the orbit is completely cleared. If the bone of the posterior wall is broken through, the lymph vessels in the pterygomaxillary fossa and the infratemporal region may be the site of cancerous lymphangitis, and all

of this area must be destroyed by coagulation and evacuated. It is not usual for difficulties to arise from hemorrhages from the internal maxillary artery if the external carotid is ligated beforehand. In evacuating ethmoidal tumors Öhngren cooks the mucous membrane in the nasopharynx and sphenoidal sinus, for although it presents a normal appearance to the eye, the microscope frequently shows that it contains incipient tumor deposits.

Since 1927 the majority of his patients have been treated also with high voltage x rays usually with filtration equivalent to 2.6 mm of copper. Daily doses of  $\frac{3}{4}$  to  $\frac{1}{2}$  H E D are given to different fields in turn. The fields are selected so that a cross fire against the area affected by the tumor will be obtained. Since 1929 the telerradium apparatus containing 3 gm. of radium has been used to irradiate the tumor from 6 or 7 different ports. The total amount of irradiation has varied from 30,000 and 70,000 mgm. hr. The distance from the radium containers to the skin has been 6 cm., and the total filtration equivalent to 6 mm of lead. The post-operative irradiation is given along the same lines as the pre-operative treatment. Relatively small x ray or telerradium doses are given and often repeated in 2 or 3 series at intervals of about 3 months. In cases of suspicious enlargement of regional lymph glands the postoperative treatment is directed mainly to the neck. Telerradium is used instead of x rays. The application of radium at the operation, although of proved benefit, is not without disadvantages as it is apt to cause extremely protracted osteonecrosis and greatly reduce the ability of the tissues to heal. In the treatment of the metastases in the neck in cases of maxillary tumor, irradiation alone has given better results than irradiation combined with block dissection.

WOODMAN stated that the classical incision has long ago been abandoned. An incision through the mucosa of the lower eyelid has been found more satisfactory. However, while this prevents a depression beneath the lower eyelid and subsequent edema, it leaves a deformity in the angle of the eye. If the growth is low in the alveolus it may be reached easily from the oral aspect by turning back the mask of the face or by an incision made along the side of the nose, beneath the nostril, and vertically through the upper lip, which makes it possible to turn aside the lower half of the face. The postnasal space is packed off. The operation is carried out with the patient sitting up and without ligation of the external carotid. Starting in the eyebrow, the incision passes down the side of the nose and through the lip. The eye is turned well out. Generally Woodman uses an ordinary scalpel for the incision down the side of the nose. He obtains good results from the use of radium in the mouth, but questions whether radium is of much value in the upper jaw.

PATERSON called attention to the fact that symptoms and signs may be entirely absent in cases of malignant tumor of the upper jaw. An inflammatory process may closely simulate malignant dis-



case and vice versa, and in some cases the 2 conditions may be associated. Every patient suspected to have a malignant tumor of the upper jaw should be carefully examined for areas of anesthesia in the skin or mucous membranes supplied by the second division of the trigeminal nerve. There may be complete anesthesia over the cutaneous area supplied by the infra orbital nerve, or only a small patch of anesthesia or hyperesthesia. Similar changes in sensitivity may be found in the mucous membrane lining the roof of the mouth. If the disease extends high up in the nose, the nasal branch of the ophthalmic nerve may become compressed. In the majority of cases Patterson prefers to combine ordinary surgery with diathermy. He stated that a skin incision should be made (1) when the growth appears to involve the floor of the orbit (2) when the ethmoid is apparently involved and (3) when the tumor is suspected to have penetrated the bone and involved the deeper tissues of the cheek. When the growth is confined to the roof of the mouth or has invaded the lower part of the nose or antrum there is no advantage in an external incision and the operation should be carried out entirely through the mouth. No attempt should be made to close the opening by plastic methods. A good obturator can always be fitted by a competent dental surgeon.

Wood stated that she uses 2 x 1 gm radium units together 1 on each side. After completion of the external irradiation the hard palate on the side of the growth is removed and a local application of radium is made to the interior of the antrum. The applicator is mounted on an upper denture with a projection which fills the antrum. It is into this projection that the radium is placed. By careful distribution of the radium in the applicator a homogeneous dose can be delivered without causing osteonecrosis. Wood emphasized the value of beginning the treatment of tumors of the upper jaw by external irradiation. By this means such regression of the growth is often brought about that removal of the hard palate alone followed by electrocoagulation of the walls of the antrum and the local application of radium is sufficient to yield a successful result. An extensive operation is thereby avoided and external incision rendered unnecessary.

Cade said that for the differentiation of carcinoma from sarcoma originating in the antrum histological examination is necessary. For small celled or large celled sarcoma of the antrum the ideal treatment is roentgen irradiation alone. In cases of carcinoma the dangers of irradiation are increased by the presence of sepsis, inadequate access and insufficient drainage. The method which Cade has used for 10 years is fenestration through the mouth removal of the hard palate and the application of radium by means of dental appliances. He states that the danger of radium necrosis after this procedure is no greater than that associated with diathermy. In cases of malignant tumor of the upper jaw, irradiation combined with

surgery is slightly more beneficial than either irradiation alone or surgery alone.

JOSEPH K. VARAT, M.D.

## EYE

Davidson M. The Minor Sequelæ of Eye Contusions. *Am J Ophth* 1936, 19: 757

Major eye injuries and their late complications are seldom untreated and seldom disputed in compensation adjustments. Minor eye contusions often masked by the superficial lesions, and minor sequelæ have not received sufficient attention. Frenkel in a series of articles published during and since the war reported the only systematic attempt to deal with these minor sequelæ.

The material studied was taken from the 2700 cases of eye injuries examined in 1935 at the Bureau of Workmen's Compensation in New York City. Intraocular pathological changes were found in 15 per cent of the cases and in one third of these were due to contusions.

In order to gain a clear conception of minor contusions and their sequelæ and of the validity of Frenkel's anterior segment traumatic syndrome 34 cases were selected for tabulation. The ophthalmologists reports and C 5 forms rarely contained more than summary diagnoses and the principal findings. The cases were seen months or years after the injury, and the observations of the sequelæ are those of the author.

All anterior segment findings recorded are those made with the slit lamp and microscope but transillumination of the lens by the diaphragm method with the slit lamp and unaided eye was found more satisfactory than with the microscope because the brightness of the fundus reflex is much reduced when examined with the microscope. That it is a fundus reflex and not as is often stated in books on slit lamp microscopy a reflection from the lens is obvious from the fact that the translucent areas are red whether the lens is cataractous or not and whether the lens defect is limited to the pigment layer or traverses the entire thickness. In transillumination of the pupillary border of the lens reflection from the lens occurs and the translucent border is not red.

Brown deposits on Descemet's membrane were noted only once and do not form part of the contusion syndrome except in the presence of a complicating uveitis. Their frequent presence in iritis and uveitis, particularly the chronic and senile types has acquired the significance of a differential diagnostic sign. They are smaller and darker than those seen in the vitreous. Their origin is probably pigment laden phagocytes rather than retinal pigment.

The most frequent sequela of eye contusions is traumatic mydriasis. The pupil is most commonly D shaped. It is sluggish in reaction to light and in convergence and reacts poorly to mydriatics and miotics. Sphincter tears being rare application of

the term "paralytic mydriasis" to the condition is misleading. Since both sphincter and dilator are involved, the best term is 'traumatic iridoplegia'. Traumatic iridoplegia was present in 85 per cent of the cases studied.

Another frequent sequela of eye contusions is the occurrence of delusions of the iris pigment layer. These are single or multiple and vary in shape. They correspond to Fuch's peripheral dark zone, where the iris is thinnest. The lesion is an incomplete rudimentary iridodialysis in which the pars of the dilator suggests that both the retinal and dilator layers are involved. Iris lesions are found in 50 per cent of all cases and so called sphincter tears in only 15 per cent. Other conditions in which iris transillumination occurs must be considered in the differential diagnosis.

**Lens lesions (opacities and subluxations)** were noted in 60 per cent of the cases studied. The most frequently observed lesion is the small, tenuous, somewhat striated anterior subcapsular opacity. Other contusion opacities are the transient posterior cortical, permanent posterior capsular, and coronary opacities, equatorial "riders," the late anterior cortical rosette, and the late total traumatic cataract.

Retrolenticular pigment particles were noted in 56 per cent of the cases. These are large and bright red, and easily distinguished from the smaller, dull brown granules seen after vitreous hemorrhage.

Minor sequelae are often noted in the fundal periphery and at the fovea. The minor foveal whitish or pigment stippling and the parafoveal yellowish or slightly pigmented small patches are best seen by indirect ophthalmoscopy. They may be present with 20/20 vision, and are frequently overlooked. Peripheral traumatic lesions seldom reported were found in 56 per cent of the cases studied.

As a rule Frenkel's conception of the anterior segment traumatic syndrome was justified by the presence of from 2 to 6 lesions anatomically related to each other which extended from the iris root along the lens equator, zonule ciliary body, ora serrata, and vitreous. Frenkel's idea of the backward displacement and rebound of the lens on an equatorial axis is supported by slit lamp observation of the sequelae. The anterior segment traumatic syndrome is more common than the posterior-segment syndrome and is not often complicated by posterior pole lesions. The latter were found in only 20 per cent of the reviewed cases. EDWARD S. PLATT, MD

outgrowth of the stroma to the stroma. Because of these the membrane is torn and can be torn.

Descemet's membrane is torn and can be torn.

Bowman's membrane is torn and can be torn. This is evident in the rations of the membrane. wound, it is torn. these phenomena.

Descemet's membrane infiltrates, and operation procedures are not. ment of Descemet's during eye surgery as possible to the resistance from the membrane to overcome the membrane. in Soderman's.

One of the trephination, occurs when the opening but it is and covers a junction a few days the opening then be cut thus.

1 The peripheral rim of the membrane with the brane.

2 The face of the pectinate face of the glaucoma.

Descemet's membrane chemical infiltration membrane.

Gifford, S. R. Detachment.

Gifford says: vance made in past twenty years detachment. that the tears were the cause of ment in his suitable for operation obtained.

Modification cauterization of the flat cornea.

**Fuchs, A. Some Anatomical Details of Importance in Ocular Surgery.** *Arch Ophth*, 1936, 16: 341.

Among the anatomical structures discussed by Fuchs are Bowman's membrane and Descemet's membrane.

Bowman's membrane is developed embryologically from the outermost layer of the corneal lamellae. Hence it is very intimately associated with these lamellae and cannot be readily dissected from the stroma. Descemet's membrane, being an

Alcal Treat- the Tongue 103 du cancer de l'Acad de

ner of the cal glands

the use of carbon dioxide snow by Bietti. In certain cases Weve employed microcoagulation, using a fine needle inserted just through the sclera and choroid as an active electrode and a current of 50 ma. The coagulation was repeated until the carefully localized hole was entirely surrounded. Escape of fluid through the numerous punctures allowed the eye to become rapidly soft.

To meet this condition, Safar devised a set of short pins with buttons, both single and multiple which were inserted, treated with the proper current and left in until the operation was complete when all were removed and the fluid was allowed to escape.

American ophthalmologists are more familiar with the pins devised by Walker. These have several advantages as they can be sterilized, they are easily applied and the application can be made far back on the globe. Two more recent methods are diathermy with a pyrometric electrode as carried out by Coppez and electrolysis as employed by von Szily and Machemer and by Vogt.

Gifford has used the Safar method with Walker's pins for the past three years. In a number of cases he has considered the condition inoperable because the detachment was over six months old and good results are exceedingly infrequent after that length of time. In numerous cases old age of the patient was considered a contra indication to the operation especially if the other eye was in good condition. Also excluded from the treatment were a few cases in which a recurrence had followed an operation of another type.

Gifford emphasizes that every attempt must be made to find the retinal hole or holes and that maximal dilatation of the pupil is important. A good pre operative night's rest must be assured. He obtains this by giving the patient  $1\frac{1}{2}$  gr of phenobarbital or phenobarbital sodium. For the relief of pain and the prevention of postoperative vomiting he has found dilaudid ( $1\frac{1}{2}$  gr) most satisfactory.

Atropin sulphate is instilled for a number of days before and on the morning of the operation. One drop of a 2 per cent solution of butyn is instilled before scrubbing and irrigation of the eye and this is followed by the deep injection of procaine hydrochloride. During the operation frequent ophthalmoscopic control is necessary. After the operation almost complete immobility of the head for the first four days is essential. In the author's cases in which the detachment is above the foot of the bed is raised slightly for the first four days, and in those in which the detachment is below, the back rest is raised 15 degrees or more. The first dressing is done after four days but both eyes are kept closed and the patient is kept in bed for two weeks. At the end of two weeks a small hole in the shield or hole glasses are allowed. The patient is permitted to go home after from three to four weeks. After from six to eight weeks a pair of lenses frosted except for center areas of from 4 to 6 mm. are substituted for the hole glasses.

The results in the author's relatively small series of cases while not so good as those reported by Weve and Safar, agree fairly well with those in most other series of cases, such as those of Veit and Dollfus, Knapp Walker, and Dunnington and MacNee. They indicate what the results should be in an average series. Gifford believes that improvement in the results may be expected from increased experience and especially from wider recognition of the fact that detachment of the retina is a surgical condition which should be operated upon at the earliest possible moment. **LESLIE L. MCCOY, M.D.**

**Walker, G. B.** The Surgical Treatment of Separated Retina by the Galvanic Method. *Am J Ophth.* 1936 19 558

The author describes his modifications of Vogt's technic for the treatment of separated retina by the galvanic method. Instead of placing the anode on the sclera, he applies it under the patient's shoulder. He employs an apparatus with which galvanic or diathermy currents may be used according to the requirements of the individual case.

**SAMUEL A. DUFF, M.D.**

## EAR

**Guild, S. R.** Hearing by Bone Conduction. The Principles of Transmission by Sound. *Ann Otol Rhinol & Laryngol* 1936, 45 736

The author states that in hearing by bone conduction the important pathway by which the sound waves reach the inner ear is osseous rather than osseotympanic.

The terminal part of the osseous pathway which is of most importance consists of the osseous trabeculae that connect the medial part of the posterior wall of the external auditory canal to the inferolateral aspect of the horizontal semicircular canal (called in this article the 'subaditus trabeculae').

This osseous pathway is of more importance than are the other osseous pathways to the inner ear because of the direction from which and the place at which the sound waves passing by way of the subaditus trabeculae enter the intralabyrinthine fluids.

Lesions of this important pathway for the conduction of sound waves to the inner ear cause impairment of the threshold of hearing by bone conduction.

**JAMES C. BRASWELL, M.D.**

## NOSE AND SINUSES

**Beck, J. C. and Guttman, M. R.** Basaloma or So Called Cylindroma of the Air Passages. *Ann Otol Rhinol & Laryngol* 1935 45 618

The authors call attention to a rare group of tumors occurring in the mucosa of the respiratory tract and its adnexa which run a characteristic clinical course and have a unique histologic structure. They state that while in the past there has been some disagreement as to the histogenesis and

classification of these neoplasms it is probable that they are mucosal basal cell growths which run a course comparable to that of basal cell tumors originating in the skin. The term "cylindroma" is descriptive of their morphological character, but they are probably more correctly termed "cylindromatous basalomas."

Histologically, they present the picture of cell nests surrounded by a connective tissue stroma. The cell nests frequently show a central lumen containing a pink staining material and sometimes cellular debris. Clinically, like their counterparts in the skin, the tumors are slow growing, invasive, and locally destructive. They do not metastasize, but recur repeatedly after removal. They are relatively radiosensitive. They are possibly best treated by extensive resection or irradiation.

The authors add 3 cases to the 37 they have found in the literature. In 1, the tumor originated in the antrum, in 1 in the sphenoid and in 1 in the trachea.

JAMES C. BRASWELL, M.D.

## MOUTH

**Haentzschel, K.** The Eugenic Significance of Congenital Clefts of the Lip, Jaw, and Palate (Die eugenische Bedeutung der angeborenen Spaltbildungen im Bereiche von Lippe, Kiefer, und Gaumen). 1933, Leipzig, Dissertation.

This monograph is based on very extensive studies, observations, and follow-up investigations made in 128 cases of cleft lip, jaw, and palate. The studies date back to 1910. The material was obtained from various localities and from various hospitals with as many different methods of operation.

It was found from the start that facial clefts are the most common of all congenital deformities. In 20.4 per cent of the cases the factor of inheritance in ascent or descent could be demonstrated. It is to be assumed that the condition was hereditary also in the remaining 80 per cent as there is no possibility of referring the occurrence of facial clefts to other causes and these clefts are very often combined with other hereditary defects. The deformity varies in degree. Therefore, in an investigation of the cause, certain forms such as the so called healed intra-uterine cleft palate, a cleft like defect in the bone which can be distinguished only by palpation of the roof of the mouth, are easily overlooked. The theory that such defects may result from psychic trauma (fright from a dog and the like) has been definitely disproved. The deformity is congenital and not of amniotic origin. The inheritance is polymeric and recessive. Thirty five and one tenth per cent of all cases show additional anomalies and deformities, especially a slight degree of congenital feeble-mindedness. The latter eugenically dangerous defect occurs in 11.7 per cent of persons with clefts. In such persons it is therefore 8 times as frequent as in the general population. Moreover, the relatives of one-fifth of all persons with cleft defects are affected

through heredity by nervous diseases, epilepsy, or feeble-mindedness.

Regardless of the time of operation or the technique employed, the average operative result in all forms is only fair. The result depends upon the patient himself, as his will and intelligence will determine the improvement of speech. Good speech was attained in only about 7 per cent of the reviewed cases. Follow-up investigations showed also that failures in school and in business life were due to the associated deficiencies. They showed, further, that the incidence of marriage is independent of the severity of the deformity or the success of operative treatment, and that more than half of the married patients with clefts were married to definitely inferior partners.

All forms of cleft formation, from the slightest cleft lip to the pronounced cleft of the hard palate, must be considered hereditary afflictions. Operative correction cannot overcome the pathological hereditary tendency.

In conclusion the author says that as the theory of hereditary genesis must be regarded as valid in all cases, sterilization of all individuals with clefts should be demanded.

(GERMAN) ROBERT H. IVY, M.D.

**Searby, H.** The Treatment of Carcinoma of the Tongue. *Med. J. Australia*, 1936, 2, 210.

Searby states that in the great majority of cases of carcinoma of the tongue the cause of death is glandular metastases. There is no evidence that irradiation therapy is effective against glandular metastases, but there is abundant evidence that, in some cases, surgical excision, properly performed, can either prevent their occurrence or cure them. Cure depends upon their extent and type.

Surgical excision can cure primary lesions in the tongue when the principles of cancer surgery can be followed. When the anatomical situation of the lesion is such that these principles cannot be followed, and for the avoidance of mutilation when they can be followed, it is necessary to rely on the selective destructive effects of radium for cure of the primary growth.

It seems that, in appropriate dosage, radium is capable of producing a remarkable disappearance of the outward signs of carcinoma of the tongue when surgical excision cannot be considered.

Every case must be regarded as an individual problem. There can be no fixed rule for treatment.

Searby urges the removal of all teeth prior to any form of treatment in the mouth, radiological or surgical, as this will prevent most of the troubles of infection.

ROBERT H. IVY, M.D.

**Tallhefer, M. A.** End-Results of Surgical Treatment of Adenopathies in Cancer of the Tongue (Traitement chirurgical des adénopathies du cancer de la langue. Résultats éloignés). *Mém. de l'Acad. de chir.* Par. 1936, 62, 977.

The author reviews 93 cases of cancer of the tongue in which surgical removal of cervical glands

was done. In general, the tongue cancers were treated with radium needles. The neck dissection included exeresis of the submaxillary gland the sternocleidomastoid muscle, and the internal jugular vein. It was performed, on the average three weeks after the radium treatment of the tongue and was always unilateral (a manifest error in some cases). Whenever histologic examination showed invasion of the glands by the cancer the operation was followed by supplementary radium treatment.

The incidence of glandular invasion and the results were as follows:

	Patient's with glandular invasion
19 complete cures of tongue and cervical region	
17 patients living	10
2 patients dead from intercurrent disease after five years	2
64 failures	
3 operative deaths	3
4 deaths from intercurrent disease before five years	2
4 recurrences sites undetermined	3
19 glandular recurrences to have cured	
10 on side operated upon	10
6 on opposite side	6
3 bilateral	3
19 lingual recurrences (glandular region apparently cured in 3 cases for more than two years)	11
15 glandular and lingual recurrences	
13 on side operated upon	11
2 on opposite side	2
6 distant metastases	6
	60

The author concludes that the incidence of cure can be increased if glandular dissection is done early and is performed on both sides of the neck when this is indicated by the site or extent of the primary lesion.

ROBERT H IVY M D

#### Holmes M J A Statistical Tabulation of the Results of Treatment of Carcinoma of the Tongue *Mel J Australia* 1936 2 103

The tabulations presented by the author, 14 in number, were made from figures supplied by 8 large hospitals located in the 6 largest cities of Australa which for a number of years have used a uniform system of recording cases of cancer and have carefully followed up patients after their discharge. This system of recording and following up was begun in 1929 after the distribution of Commonwealth radium. The tabulations of results of treatment cover the period from 1929 to 1932.

The cases have been classified anatomically according to the extent of involvement into the following 4 groups:

1 Those of carcinoma limited to the tongue, without clinical evidence of involvement of the regional lymph nodes

2 Those in which the carcinoma involved the tongue and the floor of the mouth but there was no clinical evidence of lymph node involvement

3 Those with clinical evidence of involvement of regional lymph nodes secondary to the carcinoma of the tongue

4 Those in which the carcinoma had extended from the tongue and floor of the mouth to neighboring bone

Of the patients treated only by radium irradiation of the tongue none of 3 survived after seven years, 2 of 15 survived after six years, 3 of 15 survived after five years, 4 of 17 survived after four years and 7 of 14 survived after three years.

In the first and second stages of the disease the number of patients treated by surgery alone is relatively small and the results do not appear to be so favorable as those obtained by irradiation alone or by irradiation combined with surgery.

The combined figures for all methods of treatment show that of 112 patients treated in the first or second stage of the disease, 32 (28 per cent), and of 168 treated in the third or fourth stage of the disease 12 (7 per cent) were alive from three to six years later.

Of the 47 patients treated in the first stage who have died, 12 (25 per cent) were free from evidence of recurrence or secondary extension at the time of death. In the cases of 18 (40 per cent) the primary lesion had healed and death was due to secondary extension. Therefore in the cases of 65 per cent of the patients who have died the treatment was of appreciable benefit although death resulted. Of the 146 patients treated in the third or fourth stages of the disease who have died 61 died either without recurrence or secondary extension or as the result of secondary extension after healing of the primary lesion. Although treatment may prolong life only a year or two it greatly relieves the pain.

In conclusion the author urges close collaboration between the surgeon and radiologist as in many cases the best prospects of successful treatment are offered by a suitable combination of surgery and irradiation.

ROBERT H IVY M D

#### PHARYNX

#### Richards G E The Radiological Treatment of Cancer Methods and Results III Malignant Lesions of the Tonsil and Its Pillars *Canadian J Ass J* 1936 32 338

This report is based on 42 cases of carcinoma and 10 cases of sarcoma involving the tonsil or its pillars. Of the patients with carcinoma, 17 are living of whom 15 are free from symptoms, 2 died of extraneous disease without recurrence of the malignant growth, 21 died of cancer, and 2 cannot be traced. Of the patients with sarcoma 5 are living and 5 are dead.

On the basis of the pathological findings alone it appears that in cases of carcinoma the prognosis is most favorable when the lesion is of the basal cell type, next most favorable when the lesion is of the transitional type and least favorable when the lesion is of the epidermoid type which is the most

common type. Of the reviewed cases of sarcoma, all of the successful results were obtained in those of lymphosarcoma.

In the method of treatment used by the author at the present time the initial treatment consists of a carefully planned course of telerradium therapy (4 gm radium bomb) which includes the primary lesion and the entire area of regional lymphatics and is pushed to the point of satisfactory tissue reaction in both the tonsillar region and the skin. In the majority of cases the primary lesion heals with no visible scarring. When it fails to do so, radium is applied locally by the interstitial method with the use of highly filtered needles. In cases without glandular involvement and those in which palpable glands disappear following the treatment described, no surgery is undertaken, but the patient is kept under careful periodic observation and the irradiation treatment is repeated as a prophylactic measure. If involvement of glands fails to disappear following the first course of telerradium therapy, dissection of the neck is done, provided the primary lesion has been controlled or is responding favorably, and is followed by as intensive post-operative radiotherapy as the skin is able to tolerate without an undue reaction.

JOSEPH K. NARAT, M.D.

### NECK

Cimino, S. Malignant Epithelial Tumors of the Thyroid Gland (Sui tumori epiteliali maligni della tiroide). *Tumori*, 1936, 22, 385.

Cimino states that in cases of malignant tumor of the thyroid gland the histologic findings are often very complex and certain metastatic manifestations may be very difficult to interpret. Therefore the diagnosis is often not made early and adequate treatment cannot be instituted. Furthermore the physiopathological features of malignant neoplasms occurring in the thyroid gland are only incompletely known.

The author reports 3 cases. The first was that of a woman thirty-two years old who, one year previously had first noticed a swelling in the right anterolateral region of the neck which became larger during menstruation. Under local anesthesia induced with pericaine the right lobe and the isthmus of the thyroid gland were removed. Histological examination revealed a tumor with the structure of a solid alveolar carcinoma. The epithelial cells were markedly polymorphic. Some were cylindrical and others cubical. They had a granular cytoplasm and an eccentrically placed nucleus. A few mitotic figures were present. The cells were arranged irregularly. In some places there were cords of cells which anastomosed with one another in a reticulum like arrangement. The patient was of the brachymorphic eugonitic type with an average basal metabolic rate of +18.

The second case was that of a woman forty-two years old who, seven years previously, had noticed a

small swelling of the neck which gradually became larger. Histological examination of the surgical specimen showed papillomatous structures and complete absence of normal thyroid tissue. The epithelial lining of the papillae was single- or multi-layered. The cells were cylindrical or cubical and had a rather clear protoplasm which toward the free pole sometimes presented a few granulations with a large median or basal nucleus and well staining chromatin. The tumor was a solid papilliferous epithelioma.

The third case was that of a woman forty years old. Examination of the surgical specimen revealed the presence of a papilliferous epithelioma of the cystic unilocular type. The papillae protruded into the cystic cavity whereas the outer lining was smooth. The patient was of the dolichomorpho-sympatheticotonic type with symptoms of hypermobility, psychic hyperesthesia, muscular tremors, hypertension, and loss of weight. The basal metabolic rate was +38.

The author states that the functional condition of the gland may be judged from the blood sugar curve. In the first case the blood sugar curve was normal whereas in the third case glycemia was present even in the fasting condition.

Cimino discusses the histological and physiopathological features of malignancies of the thyroid gland in the light of the recent literature.

RICHARD E. SOMMA, M.D.

Jackson, C., and Jackson, C. L. Acute Laryngotracheobronchitis. *J. Am. M. Ass.*, 1936, 107, 929.

Acute laryngotracheobronchitis occurs most often and is most severe during epidemics of so called influenza. In from 3 to 5 per cent of the cases the influenza bacillus seems to be the cause and occasionally other organisms are responsible, but in over 90 per cent of the cases the condition is primarily or secondarily of streptococcal origin. The mortality in children under 3 years of age is about 70 per cent.

In laryngismus stridulus the mucosa is lavender, violet, or grayish but otherwise normal, and the discoloration quickly disappears when the airway is laryngoscopically held open. It is suggested that the attacks may be due to the inspiration of pharyngeal secretions during sleep, following which the sudden and violent efforts to inhale draw in the laryngeal orifice in a sphincteric closure.

In diphtheria limited to the larynx and tracheobronchial tree there is a fibrinous exudate which, objectively, is very different from the inflammatory exudate seen in streptococcal infection of the same mucosal areas.

In acute laryngotracheobronchitis the outstanding feature is bronchial obstruction by inspissated secretion which the patient is unable to expel because of weakness or absence of the cough reflex. Therefore in the treatment of the condition the following facts are of importance:

1 The routine administration of atropine and opium derivatives is illogical in theory and often fatal in practice

2 The superheating of the air in hospitals and homes favors the inspissation of secretions Outside air at zero contains little water even at the dew point When this air is heated to 70 degrees F it becomes extremely desiccating to the secretions and almost caustic to the mucosa The air surrounding the patient with laryngotracheobronchitis with inspissating secretions should be humid to saturation

3 An impaired percussion note and increased respiratory rate usually mean, not pneumonia or bronchopneumonia, but obstructive atelectasis and call for peroral or tracheostomic aspiration of the secretions In extreme cases forceps removal of crusts is the only means of saving life Such potentially fatal conditions can be prevented by humid air and the avoidance of atropine, opiates, and other desiccating medicaments SAMUEL KAHN MD

Cardi G A Case of Pachydermia of the Larynx with Neoplastic Development (Sopra un caso di pachidermia del laringe a sviluppo tumorale) Tumors 1936 22 353

In 1852, Rainer observed that, as the result of chronic inflammation the stratified squamous epithelium of the pharynx, epiglottis, interarytenoid space, and vocal cords may undergo histopathologic changes which are strikingly similar to those observed in the skin In their course these processes present themselves mainly in a forms, one characterized by the luxuriant production of epidermoid epithelium which often becomes keratinized, and

the other characterized especially by involvement of the connective tissue To these and similar processes Virchow gave the name "pachydermia"

The case of pachydermia of the larynx reported by Cardi was that of a man sixty seven years old who was a heavy smoker When the patient was seen in the clinic his voice was hoarse and he complained of a burning pain in the larynx Laryngoscopic examination revealed slightly above the left vocal cord, an ovoid mass about the size of a small nut which had a whitish, irregular and papillomatous surface The vocal cords appeared normal and vibrated freely The mass was removed under novocain anesthesia

Histologic examination showed the tissue to be made up essentially of epithelial elements derived from the mucosal lining The epithelial lining had been transformed into aggregations of prickle cells down to the level of the basal layer In some areas the hyperplasia was more pronounced and the epithelial layer was thicker giving the surface of the tumor a verrucoid aspect However, the main portion of the neoplastic growth was made up of spinous elements among which were eosinophiles Mitoses were almost absent, and no epithelial pearl formation was observed In some areas there were masses of cells perforated by a cavity of irregular form within which were small blood vessels containing the elements of normal blood

After reviewing the literature the author discusses the relationship between pachydermia and carcinoma Most investigators seem to agree that pachydermia is a precancerous lesion, but Cardi rejects this theory RICHARD E SOMMA MD

# SURGERY OF THE NERVOUS SYSTEM

## BRAIN AND ITS COVERINGS, CRANIAL NERVES

Cramer, F. The Clinical Diagnosis of the Tumors of the Corpus Callosum *Bull Neurol Inst New York*, 1936, 5 37

The author reports 6 cases of verified tumor of the corpus callosum. The diagnostic symptoms of such neoplasms appear to be apraxia and "mental signs." It is important to recognize apraxia in all its forms. Apraxia should be considered present when there is a markedly inadequate or incorrect performance of usual purposeful acts by muscle groups in which the potential ability to function is normal or nearly normal. This may be observed in ocular, facial, faucial, glossal, truncal, and appendicular functions.

The "mental signs" consist of a disturbance of consciousness which varies from inattention and apathy to stupor and coma. In the reported cases, decompression by dehydration relieved the drowsiness, but failed to change the patient's appearance of marked reduction of consciousness. The effect was therefore quite unlike the usual effect of such treatment in cases of stupor resulting from a generalized increase of intracranial pressure. It appears that the anatomical location of the tumor rather than the intracranial pressure is responsible for the disturbance of consciousness.

DAVID J. IMPASTATO, M.D.

Cohen, I. Neoplastic Cysts Communicating with the Lateral Ventricles *Bull Neurol Inst New York*, 1936, 5 21

Neoplastic cysts communicating with the lateral ventricles are not frequent. Air injected by the lumbar route fills the cysts and renders them visible. In Cohen's 2 cases the lateral ventricles were dilated but not displaced. The spinal fluid is bloody or xanthochromic because of bleeding into the cysts. According to the author, these communicating cysts do not cause ventricular displacement because the pressure within them is the same as the pressure in the ventricles.

DAVID J. IMPASTATO, M.D.

Franklin, C. R. Visual Studies in Pituitary Adenoma *Bull Neurol Inst New York*, 1936, 5 180

An analysis was made of the visual findings in 28 verified cases of pituitary adenoma in an effort to determine the factors of importance in the diagnosis and in the prognosis as regards postoperative vision.

In 4 of the cases the tumor was a chromophil adenoma, in 4, an adenoma of a mixed type, in 11, a chromophobe adenoma, in 6, a cystadenoma, and in 3, a simple adenoma. The operative mortality was 28 per cent. In 21 cases there was bitemporal hemianopia, in 2, homonymous hemianopia, in 3, blindness of one eye with temporal hemianopia in

the other, and in 2, general contraction of the fields.

Failing vision was the initial symptom in 63 per cent of the cases. The duration of the visual symptoms before operation seemed to bear a definite relation to both the incidence and the degree of postoperative improvement. Nine of 10 cases with visual symptoms for less than 10 years showed improvement in vision following operation, and in 3 of 8 cases with symptoms for from 2 to 7 years there was local improvement.

Although postoperative improvement of vision is possible in blind eyes, the degree of improvement is proportional to the visual acuity before operation. If preoperative vision is decreased to the perception of hand movements there is little hope of useful postoperative vision, but if preoperative vision is 20/50 or better the chance of restoration of normal visual acuity is good.

The appearance of any marked degree of contraction in the visual fields seems to be an unfavorable prognostic sign. In the cases reviewed x-ray therapy before operation did not appear to check progressive failure of vision. The effect of postoperative x-ray therapy on vision was not determined definitely because of the lack of a sufficiently large control series of cases not receiving this treatment.

The author concludes that the prognosis as regards postoperative restoration of the visual fields in cases of pituitary adenoma is directly dependent upon the time of surgical interference.

ROBERT ZOLLI-GER, M.D.

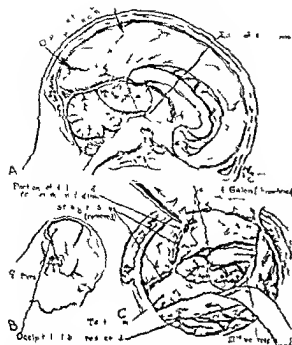
Dandy, W. E. Operative Experience in Cases of Pineal Tumor *Arch Surg*, 1936, 33 19

The author, who has operated on 10 cases of pineal tumor, reports in detail 3 cases treated surgically with good results.

The symptoms consisted chiefly of signs and symptoms of intracranial pressure due to occlusion of the aqueduct of Sylvius. Occasionally there were localizing signs such as ptosis, which was usually bilateral, limitation of the upward movements of the eyes, and fixation and dilatation of the pupils. In none of the 10 cases were there any endocrine disturbances. The most important objective evidence of the tumor, especially in children, was a roentgen shadow indicating calcification in the pineal region. The final localization and diagnosis depend upon ventriculographic changes, namely, a filling defect in the posterior part of the third ventricle and obliteration of the suprapineal recess. Six of the author's 10 patients were children between 10 and 17 years of age. Dandy's method of exposing and removing a pineal tumor is shown by illustrations and discussed in detail.

The pineal tumor is exposed by an occipital approach, separation of the right cerebral hemisphere from the falx, and splitting of the corpus





Drawings illustrating the method of producing more adequate exposure of a large tumor in the pineal region. When the ventricles are relatively small or the tumor is relatively large, the only possibility of carefully extirpating the growth is excision of the posterior part of the hemisphere to provide room. A shows the relative size and position of the tumor which extended backward under the tentorium and dislocated the cerebellum. B indicates the amount of the posterior pole of the brain that was removed for the exposure. C shows the method of removing when necessary the lower part of the falx parts of the right and left sides of the tentorium and the straight sinus. The caudal pole of an extensive tumor of this kind cannot be reached without this additional exposure. It will be noted that the straight sinus and the great vein and both small veins of Galen are included in the extirpation.

callosum. Perhaps the most essential part of the operative procedure is evacuation of fluid from the ventricular system. In cases of large tumor in which the ventricles are smaller, resection of the posterior part of the right cerebral hemisphere is necessary.

Transient blindness and subtotal paralysis of all the extra-ocular muscles followed operation in all of the 3 reported cases in which the intervention was successful, but these disturbances disappeared a week or ten days later. ROBERT ZOLLINGER M.D.

Tumarkin, I. A. Some Aspects of the Problem of Facial Paralysis. *Proc Roy Soc Med Lond*, 1936 29 162.

The various problems concerned in the treatment of facial paralysis are discussed. A study of 25 cured cases and 18 cases in which the treatment failed to cure showed that pain with loss of taste means a

to 1 chance that recovery will not result. Absence of pain with no loss of taste means a chance of 2, to 1 in favor of recovery. The author attaches less importance to the presence of only one of these symptoms and believes that in the majority of cases in which recovery fails to occur there is a lesion involving the first portion of the nerve. He bases this conclusion on the fact that 13 of 18 patients who failed to recover had crocodile tears to some degree. He shows the nerve pathways of these lachrymatory impulses by an illustration. He believes that operation delayed months or years after the onset of paralysis cannot be expected to produce much improvement. He states that there is evidence which suggests that reaction of degeneration does not necessarily mean absolute death of the nerve and even in its presence a timely decompression may still produce a dramatic result.

He describes an operation of vascular decompression. He believes that in cases of inflammation the stylomastoid artery may be enormously increased in size with the result that the thin walled veins and lymphatics in the fallopian canal are obliterated. A vicious circle ensues because blood enters but cannot drain out and therefore causes the nerve to die. He proposes a simple mastoidotomy with extension in 3 directions by removal of (1) the perifacial cells, (2) the posterior mental wall until the stylomastoid artery is ablated just as it emerges from the canal and (3) the outer attic wall to diminish tympanic congestion.

ROBERT ZOLLINGER M.D.

## PERIPHERAL NERVES

Stahl. Injuries of the Brachial Plexus (Verletzungen des Plexus brachialis). *Zentralbl f Chir* 1936 p 1541.

After describing the anatomical relationships of the brachial plexus the author discusses in detail the hitherto known double innervation of the arm and the variations which have been determined. He states that the number of bloodless plexus injuries has increased considerably by sports, industrialization and machine work. A very frequent cause of plexus injury is the motorcycle accident. The cause of the paralysis after such accidents is generally assumed to be a tearing of the plexus.

Of 24 cases of severe plexus injury observed by Kuetter, spontaneous cure resulted in 66.7 per cent and occurred within fifteen months. Kuetter therefore believes that operation for plexus injury should not be performed before eight months have elapsed.

It has been definitely proved that tearing out of the plexus with its roots may occur. This injury involves either the entire plexus or a portion of it. The first thoracic nerve is the shortest and most tense. The rear extends from there upward and all of the 5 roots of the plexus may be torn out. The plexus tears just like a tense cable at the point where it is fastened, i.e., near the point of exit from the dura.

In a case of plexus paralysis in which in addition to the roots of the plexus the third and fourth cervi

cal nerves and the accessory spinal nerve were also involved a different mechanism of injury was assumed. Exposure of the plexus showed that it had been crushed upon the transverse processes of the vertebrae. On the basis of 8 cases the author demonstrates by a detailed description of the findings and by sketches made at operation that this mechanism must certainly be quite common. In 3 cases the fifth and sixth nerve roots were crushed upon the underlying transverse processes, and in 1 case the fifth to the eighth cervical roots inclusive were crushed, but the first thoracic root was intact. In the fifth case the fifth to the eighth cervical roots inclusive were crushed upon the underlying transverse processes. The first thoracic root was torn out and lay free in the tissues. At the point in the dural sac where the tearing occurred there was a dural cyst the size of a cherry. In 1 case all of the roots were torn out so that no therapeutic measure was possible. In 2 cases only an extensive scar formation which united the plexus with the deep layer of the cervical fascia was found. In both of these it was possible to free the nerve trunk by neurolysis. In most of the cases of root crushing the other roots were embedded in more or less thick and extensive scar formations. In these cases also neurolysis without the implantation of fat or the hernial sac was done. The crushed roots were freshened with a razor blade and united end to end with fine linen thread. This was always possible without creating tension.

Although, according to Kuettner, 66½ per cent of severe plexus injuries heal spontaneously, this is not true of injuries from motorcycle accidents as the majority of the latter are not tearing injuries, but caused by an external force directed downward and inward which crushes the plexus upon the transverse

processes. In such injuries a long period of waiting is useless. Because of the high incidence of root separations, operation should not be delayed for long, at least not for six months as Kuettner recommends, nor even for three months as Demmer has recommended. All of these plexus paralyses are complete immediately after the accident. However, both motor and sensory involvement retrogress very rapidly and a definite stage of arrest is reached after three weeks at the latest. Therefore in all cases of plexus paralysis in which partial paralysis is still present four weeks after the injury the paralysis was complete at least temporarily. For the paralysis that still remains four weeks after a motorcycle accident, operative measures should be taken.

In the discussion SCHUM reported a case in which plexus injury with shattering of the right scapula and fracture of the first and second ribs near the vertebral articulation was caused by a crushing and severing force.

SCHOEN called attention to the possibility that plexus paralysis may be caused by the use of hard unyielding shoulder supports in operations performed with the patient in the Trendelenburg position. He stated that it may be produced also by overextension of the shoulder.

SAUFBRUCH called attention to the fact that plexus paralysis may occur in individuals with cervical ribs.

In conclusion STAHL stated that in cases of cervical ribs symptoms of irritation are much more common than those of paralysis. Both disappear immediately on removal of the pressure. This is accomplished most simply by resecting the anterior scalenus muscle according to the method of Adson.

(O STAHL.) HARRY A. SALZMAN, M.D.

# SURGERY OF THE THORAX

## CHEST WALL AND BREAST

Nathanson I T and Welch G E Life Expectancy and the Incidence of Malignant Disease I Carcinoma of the Breast *Am J Cancer*, 1936 28 40

The method employed by the authors for calculating the life expectancy of patients with cancer of the breast is based on the theory that the behavior of the living will be similar to that of the dead. It is assumed, for example, that if 10 per cent of all persons known to have died of a certain type of cancer died between 4 and 5 years after the onset of the condition, 10 per cent of all patients with that type of cancer who are still living at the beginning of the fourth year will be dead at the end of that year.

The results of a study of the life expectancy of 1,565 persons with carcinoma of the breast who were observed at the Collis P. Huntington Memorial Hospital, Boston, and the Pondville State Hospital of Massachusetts are reported in detail with the aid of graphs and tables.

Of 100 persons with untreated cancer of the breast (97 women and 3 men) 25 per cent died within the first year, an additional 25 per cent were dead at the end of 2½ years and 25 per cent survived more than 4 years. The median age at the time of onset of the condition in this group was 53 years. The median age of patients with cancer of the breast who were treated was 52 years. The data show that cancer of the breast runs a more rapid course in the young than in the old.

Of the treated patients 25 per cent died within 2 years, 50 per cent within 3½ years and 75 per cent within 6½ years after the onset of the disease. Two years after the onset there were 25 per cent more patients alive in the treated than in the untreated group, after 3 years 85 per cent more and after 10 years 175 per cent more.

The normal life expectancy is about 6 times the life expectancy of women of the same age with treated carcinoma of the breast.

Of the reviewed cases only 24 (1.5 per cent) were cases of cancer in the male breast. It appears that the disease is less malignant in the male than in the female.

The life expectancy with respect to age is poorer below the fortieth year of age. After the age of 60 years it is better but in the late years it becomes slightly poorer because of the decrease in the normal life expectancy at advanced age.

In the entire group of cases reviewed the incidence was highest between the ages of 46 and 48 years. In about one third of the cases the condition appears before the age of 45 years; in another third, between the ages of 45 and 55 years; and in the remainder,

after the fifty-fifth year. It is stressed that this is the age incidence in patients seen in hospitals.

J. DANIEL WILLEMS, M.D.

Bérard, L. and Dargent M. Therapeutic Methods and Limitations in Cancer of the Breast (*Méthodes et limites thérapeutiques dans les cancers du sein*) *Lyon chir* 1936 33 513

From a study of the results of the treatment of cancer of the breast the authors conclude that in operable cases Halsted's operation is the only justifiable procedure. In inoperable cases physical agents may be used and may render operation possible later. Unfortunately even Halsted's operation does not prevent recurrences and metastases. Therefore patients subjected to it should be kept under observation.

The authors believe that prophylactic roentgen therapy is useless if not dangerous. While irradiation gives good results in the treatment of local recurrences and metastases, it should be employed for the treatment of recurrences and metastases rather than in attempts to prevent them. When used for prevention it may cause a radio-immunization which will render later treatment ineffective.

Another method of therapy that must now be taken into consideration is biochemical treatment. Arlong, Morel, and Josteraud have been studying the action of ascorbic acid and its organometallic compounds for 5 years. While it is still too early to judge their results, injections of these substances seem to have an appreciable effect on recurrences and metastases of cancer of the breast.

The authors report the case of a young woman who had a large encephaloid tumor just to the right of the right breast. Examination revealed extensive invasion of the skin and diffuse cancerous lymphangitis of the pectoral, axillary and scapular regions. The diagnosis of encephaloid glandular epithelioma was confirmed by biopsies. On biochemical treatment, the lymphangitis receded, the skin became soft and, after marked congestion, the tumor gradually decreased in size, softened and finally became gangrenous in the center. Surgical operation was then performed. It consisted of simple removal of the gangrenous tissue. Postoperatively, the improvement continued and ultimately complete cicatrization took place. Immediately after the operation the injections of ascorbic products were discontinued. Two months later a nodule appeared on the surface of the left breast and on extirpation was found to be an epithelioma of the same type as that on the right breast. The authors believe that this metastasis was present at the time the intra-venous treatment was stopped. On its discovery the injections were immediately begun again. However, other metastases appeared and necessitated a

**Halsted operation** Since the operation another metastasis has been found in the upper juxta-epithyseal region of the left humerus

In certain cases of inoperable cancer the authors have found that ascorbic acid treatment is followed by stabilization of visceral metastases, improvement in the general condition, and restoration of the appetite and strength. In a case in which the condition was developing with special rapidity it resulted in the disappearance of an infiltration in the axilla which extended to the clavicle. The patient was operated upon in April 1935, but developed a recurrence in September of the same year. The general condition was serious. A series of injections begun in January, 1936, brought about such a retrogression of the infiltration in the delto-scapular region that, in March, a radical operation was possible. The early results of the operation are very satisfactory.

In conclusion the authors state that while certain cancers of the breast react favorably to biochemical treatment, a great deal remains to be learned about the indications and contra-indications of such therapy. It is probable that biochemical treatment has some of the advantages and disadvantages of radiotherapy which depend on the histological form of the tumor, its degree of development, and factors still unknown.

AUDREY GOSS MORGAN, M.D.

#### TRACHEA, LUNGS, AND PLEURA

Kourilsky, R., and Anglade, P. H. A Clinical and Experimental Study of Atelectasis (*L'atelectasie pulmonaire et expérimentale*). *Arch. méd.-chir. de l'Appar. respir.*, 1930, 11: 251.

The authors report experiments carried out on dogs to study the clinical and roentgen findings in atelectasis. The technique of the experiments is described and the findings are shown by roentgenograms and photomicrographs. The bronchus was at first occluded with laminaria tents, but as this method always caused infection the occlusion was later effected by ligation.

It was found that occlusion of the bronchus causes mechanical respiratory disturbances before it causes atelectasis. The diaphragm rises on the occluded side and the heart and mediastinum deviate in that direction. The pleural pressure becomes negative. Clinical demonstration of these signs indicates atelectasis of a lobe. A period of at least ten hours elapses before roentgen signs appear.

For the appearance of roentgen signs the collapsed region must be of considerable size. In some of the experiments bronchi after the secondary division were ligated so that collapse of only a small territory was produced. In these there was no roentgen picture in spite of the slight hemorrhage caused by the operation. This finding is of clinical importance for it shows that the roentgen pictures ordinarily considered those of atelectasis are pictures, not of the atelectasis but of the accompanying inflammation.

The animals operated on in the manner described

lived for months. Some of them have been under observation for as long as a year. In some cases the ligature was absorbed and the lobe became permeable again. If the ligature is firm, the atelectasis may persist indefinitely and in itself does not cause cicatricial sclerosis. It does not cause sclerosis unless it is infected.

Dilatation of the capillaries occurs in the early stages of atelectasis even if it is aseptic. This is probably due to the slowing of the circulation and the capillary congestion caused by the collapse of the lung.

Of various procedures employed to determine the nervous mechanism of atelectasis, such as stimulation of the pneumogastric, section of the pneumogastric, stimulation of the left superior cervical ganglion of the sympathetic, and denervation of the left bronchus, none caused atelectasis.

AUDREY GOSS MORGAN, M.D.

Durand, H. Atelectasis. An Anatomicopathological Study (*L'atelectasie pulmonaire. Étude anatomopathologique*). *Arch. méd. chir. de l'Appar. respir.*, 1936, 11: 277.

The author claims that in recent years the term "atelectasis" has been applied to conditions that are not true atelectasis. This has been due to too free interpretation of roentgen pictures. While the roentgen findings are of great aid in the diagnosis of atelectasis they must be checked by the findings of anatomicopathological examination.

Durand defines atelectasis as a condition of the fetal lung in which the alveoli are collapsed and devoid of air but capable of being filled and regaining their normal caliber. The lungs are reduced in size and generally red like the liver or of the color of the spleen. They are engorged with blood and sink in water. The alveoli are lined with a single layer of rounded or cubical cells.

In many of the cases described as cases of atelectasis the collapse of the lung is merely secondary to some disease of the lung and of only slight importance. The condition of primary interest is bronchopneumonia, pleuropneumonia, pleurisy, or cancer. In recent years Americans have paid a great deal of attention to a group of cases of so-called atelectasis caused by occlusion of a bronchus occurring, for instance, in surgical operations, particularly operations for adenoids. A fragment of tissue dropped or inhaled into a bronchus may produce the clinical and roentgen picture of atelectasis, but removal of the foreign body is followed by recovery. Acute atelectasis may result also from severe hemoptysis. This condition is accompanied by the retraction of the lung, the rise of the diaphragm, and the displacement of the heart and mediastinum which are seen in the infant with atelectasis. The author reports 3 cases which came to autopsy.

The conditions in these cases were not nearly so simple as in true atelectasis. The alveoli were empty of air but filled with blood. In the first case

there were microscopic tubercles in the first stages of the formation. The collapse caused by the flooding with blood was evidently not a simple mechanical obstruction but dependent upon nervous factors which caused the alveoli to contract on their hemorrhagic content, the size of the lung being therefore decreased instead of increased. In the 2 other cases the lung was not collapsed or retracted although the roentgen picture was that of atelectasis.

The author states that mere absence of air does not mean atelectasis. In chronic atelectasis dense sclerosis of the tissue takes place after a time and the alveoli become incapable of distention. The condition is then not atelectasis in the true sense of the word but a cicatricial sclerosis.

AUDREY GOSS MORGAN M.D.

Racine Patte Gallot Turiet and Brincourt  
Clinical Forms of Atelectasis (Formes cliniques de l'atelectasie pulmonaire) *Arch. med.-chir. de l'appar. respir.* 1936 11 299

The easily diagnosed sudden massive atelectasis affecting a previously normal parenchyma is usually due to bronchial obstruction and disappears when the obstruction is removed. Transitory lobular atelectases and such as are surrounded by foci of inflammation or sclerosis cannot be demonstrated clinically. Topographically, atelectasis includes the total form, lobular forms and the scattered forms such as perilesional and transient forms.

Non tuberculous acute atelectases may be the result of an intrabronchial foreign body or occur as a postoperative complication. The usually opaque foreign body can be demonstrated roentgenologically. The postoperative form may follow any type of operation but is most common after laparotomies whether general or local anesthesia is used. Non tuberculous acute atelectasis is conditioned by 3 factors: (1) bronchial obstruction, (2) gas resorption and, according to Henderson, (3) loss of thoracic muscular tonus. In the authors' opinion the last factor plays a very secondary rôle.

The acute transitory atelectases of pulmonary tuberculosis may be divided into 3 chief groups: (1) posthemoptotic atelectases, (2) those due to the transbronchial migration of caseous fragments or glandular foci, and (3) those of questionable origin.

Chronic atelectases include those associated with tumor, especially cancer, and those complicating tuberculosis, whether of the pure or associated type or complicating therapeutic pneumothorax.

In chronic atelectasis with cancer there is hemithoracic retraction with respiratory dullness. The diseased hemithorax is almost immovable whereas on the normal side mobility is unimpaired. Intercostal spaces are constricted and depressed. The lesion is to the right, the heart beats over to the right of the sternum whereas in the normal lesion is to the left, the heart beats farther off in the left axilla in contrast to the lesion appears in pleural effusion. Vesicular murmur is often replaced by a tubal whisper. The remainder

transmission by condensed lung tissue. Dullness of the hemithorax is both anterior and posterior.

In the massive type, roentgen examination confirms the clinical findings and reveals the extent of the process as well as the characteristic signs of atelectasis. The involved side shows homogeneous and complete opacity. The diaphragm on that side is elevated but its arc is of a regular rounded shape. The heart and trachea are displaced but the trachea retains its linear contour without the tortuosity seen in retractile sclerosis. Fluoroscopic examination shows a pendular movement of the mediastinum with inspiratory attraction toward the involved side. The intrapleural pressure is markedly decreased. Manometric signs are of diagnostic value as the roentgen picture may be simulated by any process of pneumonic densification or sclerosis. Fibrothorax is the most frequent cause of diagnostic error. If the atelectasis is complicated by sclerosis and pleural symphysis, determination of the intrapleural pressure may become impossible.

Atelectasis is most frequently lobar and due to obstruction of a lobar bronchus. Except for their limited extent, the clinical and roentgen signs are like those in massive atelectasis. Respiratory obscuration and hemithoracic retraction are more marked on the left than on the right side. In total atelectasis expiratory and inspiratory pressure are about parallel but in lobar atelectasis only the inspiratory pressure is markedly diminished. Certain ineffective opacities may be associated with splenic metastases. If combined with mediastinal and diaphragmatic attraction, with rapid and complete roentgen study, the indications are in favor of lobar atelectasis.

Circumscribed forms of lobular atelectasis in the vicinity of various pulmonary lesions are not demonstrated histologically but not so roentgenologically. Perilesional atelectases held responsible for transitory shadows in the vicinity of such lesions without clinical manifestations. In pericavitary atelectasis the opacity disappears suddenly upon the very first instillation of pneumothorax. Transitory shadows in or tuberculous lungs may possibly be due to transitory broncholar obliteration.

The acute transitory atelectases, the tuberculous are marked congestion of the lobar. The retracted in size softened. Young gangrenous in the center. Succession then performed. It consisted of the gangrenous tissue. Postoperative improvement continued and ultimate cicatrization took place. Immediate operation the injections of ascorbic acid discontinued. Two months later a nodular on the surface of the left breast and was found to be an epithelioma of the that on the right breast. The authors this metastasis was present at the time venous treatment was stopped. On its disappearance injections were immediately begun again. However, other metastases appeared and nec

cases of metastatic cancer or reaction of the glands to distant cancer, the diagnosis is difficult. Other conditions giving rise to atelectasis are Hodgkin's disease, mediastinal cysts, lymphogranulomatosis, the glandular tumors of lymphatic leukemia, angioma, and syphilitic and tuberculous mediastinitis. If the compression involves a stem bronchus, atelectasis is total whereas if it involves an eparterial or hyparterial bronchus, the atelectasis is lobar. The mechanism by bronchial obstruction is very simple, sympathetic, parasympathetic, and phrenic factors are merely accessory.

The authors report illustrative cases of chronic atelectasis due to intrinsic bronchial stenosis, extrinsic isolated bronchial stenosis, and secondary extrinsic bronchial stenosis or stenosis associated with anterior pulmonary lesions. Cancer as the cause may be determined by elimination of other causes of bronchial stenosis, the demonstration of the neoplastic triad of age, anemia, and cachexia, and the discovery of a superficial adenopathy by biopsy. Atelectasis due to hilar cancer may retrogress if ulceration relieves the compression, but even under these conditions is usually fatal.

In atelectasis associated with diffuse cancer of the lung the diagnosis is most difficult. Bronchoscopy and roentgenography following the injection of lipiodol are of great value. In intrabronchial cancer with early atelectasis, lobectomy or pneumectomy may be justifiable. Cancer causing extrinsic compression is beyond therapeutic aid.

In chronic tuberculosis, atelectasis involving the healthy parenchyma is diffuse or lobar. When it coexists with tuberculous sclerosis or pachypleurisy it is known as "associated atelectasis." The diffuse type occurs as a rule in patients with chronic cavitation of the left apex. As there are no functional symptoms the diagnosis must be based on the roentgen demonstration of progressive obscuration of the lung. This chronic type may progress to sclerosis or be complicated by bronchial dilatation persisting after cure of the tuberculous process. It is believed by some that atelectasis is a limited process, but according to the theory most generally accepted it has an exacerbating effect, the negative intrapleural pressure favoring extension of the lesions. Bronchial obstruction seems to play the chief role in the causation of atelectasis of the healthy pulmonary parenchyma. Such obstruction may be due to ordinary inflammation or to reflex sympathetic disturbances. Paralysis of the diaphragm is also a factor to be considered.

Besides the diffuse massive atelectases there are also chronic lobar atelectases which, in contrast to the former, are more common on the right side. They are more often due to obstruction of the lobar bronchi than to diffuse bronchiolar obstruction. Atelectasis associated with sclerosis or pachypleurisy plays a part in many thoracic constrictions. In therapeutic pneumothorax massive atelectasis of the collapsed lobe is considered a favorable sign.

FRANK SCHWARTZ MOORE

Mamou, H., Patte A., and Gallot, H. M. Treatment of Atelectasis (Traitement de l'atelectasie pulmonaire) *Arch med chir de l'appar respir*, 1936  
11 331

The treatment of pulmonary atelectasis due to an intrabronchial foreign body is dependent upon whether the foreign body is fluid or solid. If it is fluid, as in posthemoptotic atelectasis, expectant treatment is justifiable as spontaneous ejection of the foreign body and retrogression of the atelectasis may be expected. In some cases ipecac may aid in the expulsion of the foreign body. A very small insufflation of oxygen after determination of the endopleural pressure may aid in the diagnosis and have a curative effect on the atelectasis. Bronchoscopy is contra indicated in the presence of hemorrhage. Atelectasis may be caused by mucus plugs as well as by blood clots.

If the foreign body is solid, expectant treatment is not justifiable as spontaneous ejection occurs in only a very small percentage of cases. The foreign body should be removed following bronchoscopy. However, the latter should not be attempted before the reaction to initial attempts at removal have subsided. If the first attempt at bronchoscopy fails, from 6 to 8 days should intervene before another is made. In 98 per cent of cases complete cure follows extraction of the foreign body.

Postoperative atelectasis is often the result of mucus obstructions due to anesthesia. Bronchoscopy with aspiration of the foreign matter is indicated. If this is done promptly the results are good. Recently Henderson has suggested carbon anhydride inhalations to stimulate the tonus of the respiratory musculature as he attributes postoperative atelectasis to a decrease of diaphragmatic and general tonus due to general anesthesia. The inhalations are begun immediately after operation to prevent atelectasis. They are given through an open mask and continued just long enough to produce a marked hyperpnea and then repeated after an interval of 5 minutes. Thereafter 2 inhalations are given every 3 or 4 hours.

Other preventive measures include careful supervision and training of children to prevent the aspiration of foreign bodies and care to remove dentures before the induction of anesthesia for operations.

In chronic tuberculous atelectasis the treatment should be directed to the causal lesion. The treatment of choice is artificial pneumothorax. Phrenicectomy is dangerous as it may itself cause atelectasis. In some cases thoracoplasty has given good results with progressive evolution to simple sclerosis. Bronchoscopy has also been attempted, but the author has not used it for this condition.

In atelectasis due to tumor of the mediastinum, radiotherapy has given splendid results especially in Hodgkin's disease. In cases of endobronchial tumor the ideal treatment is pneumectomy, but American surgeons seem to believe that endobronchial electrocoagulation of the tumor is associated with less risk and is therefore preferable.

In atelectasis associated with various pulmonary lesions the treatment should be directed to the causal disease. In syphilis, atelectasis has been favorably affected by antisyphilitic hydrargobismuth therapy.

EDITH SCHANCHIE MOORE

Monaldi V. A Résumé of Three Years of Study of the Cure of Pulmonary Tuberculosis by Anterolateral Thoracoplasty (Résumé de trois ans d'études sur la cure de la tuberculose pulmonaire par la thoracoplastie antérolatérale) *Arch méd chir de l'appar respir*, 1936 11 174

The practice of thoracoplasty in pulmonary tuberculosis is based upon the doctrine of respiratory trauma (Forlanini). Monaldi first discusses the manner in which the mechanical factors of respiration affect the different portions of the lungs.

The forces acting on the lung resolve themselves into 4 components: 2 vertical (an inferior and a superior) regulated respectively by the diaphragm and the first rib; and 2 lateral (dependent upon the movements of the ribs). It is to the second 2 components that anterolateral thoracoplasty is directed. Phrenicotomy may be added to overcome the inferior vertical component.

The thoracoplasty is performed in 2 stages. In the first stage the fourth to the seventh ribs are resected subperiosteally 9 cm being removed from the fourth rib and 4 cm from the seventh. In the second stage performed about 10 days later, 10 cm are resected from the second and third ribs; the first rib is removed entirely and the phrenic nerve is sectioned or crushed.

The extent of the operation is determined by the location of the lesions. Lesions in the upper lines of movement are treated by resection of the first, second and third ribs combined with crushing of the phrenic nerve and lesions lower in the chest by resection of the fourth to seventh ribs and phrenicectomy.

In a follow up of 200 patients subjected to this operation it was found that from 60 to 70 per cent of them were cured. In general the exterior form of the thorax was well preserved. There was a certain limitation of the vital capacity but this tended to disappear with time. The cardiac function was scarcely at all modified.

The indications for total thoracoplasty include exudative and ulcerative tuberculosis, cavitation, extensive fibrosis with small cavities, and tuberculous empyema.

The article is illustrated with 3 diagrammatic sketches and 4 roentgenograms.

ALBERT F. DE GROOT M.D.

## HEART AND PERICARDIUM

Churchill, E. D. Pericardial Resection in Chronic Constrictive Pericarditis. *Ann Surg* 1936 104 516

The author states that chronic constrictive pericarditis is a rare disease but is often not diagnosed.

Its cure by operation is one of the most important accomplishments of surgery of the heart. He believes that while rheumatic infection not infrequently causes obliteration of the pericardial cavity, the evidence that the adhesions so produced may cause the syndrome of constrictive pericarditis is slight. Active tuberculosis of the pericardium may produce the entire syndrome of chronic constrictive pericarditis but the results of operations on the heart during this phase of the disease are uniformly discouraging.

For pericardial resection in chronic constrictive pericarditis Churchill prefers general anesthesia induced in a manner to permit differential pressure if this should be necessary. He uses ether administered intratracheally. The patient is placed in a dental chair and kept in a semirecumbent position to diminish the venous return to the heart. An ample chest wall window is usually obtained by resection of the third, fourth and fifth costal cartilages with about 1 in. of the corresponding ribs. Sometimes the sixth cartilage and rib end are also resected. After ligation of the internal mammary vessels the margin of the sternum is exposed and a liberal resection of the left half is done. The left pleural reflection is then mobilized and separated from the pericardium. At times this is so adherent that opening into the pleural cavity cannot be avoided.

After exposure of the parietal pericardium by dissection and retraction of the overlying structures the pericardium is incised in the thinnest area that overlies the left ventricle. A cleavage plane is established between the myocardium and the scar. It is essential to select a plane of cleavage that lies close to the heart muscle itself. Grasping the edge of the scar and exerting traction during the subsequent dissection facilitates the exposure in the more inaccessible areas. If the scar extends laterally over the left ventricle this region is removed first. The excision may be carried as far as the phrenic nerve but that structure is never sacrificed.

As densely adherent scar is often present in the sulcus formed by the descending branch of the left coronary artery, this region is approached cautiously to avoid injuring the vessel. Frequently it is easier to approach this vessel from 2 sides. A second very adherent region is the right auriculoventricular groove, in intimate association with the diaphragmatic pericardium. It is important to free this region if possible.

Because of the thin walls of the auricles actual decortication of these chambers is too hazardous a procedure to attempt. Persistent bleeding from the pericardium is controlled by fine silk sutures.

Although the chambers of the heart are rarely entered such accidents are possible. Therefore as a safeguard a generous flap of pericardium is left attached to the point of dissection. If the chamber is entered accidentally the flap is then available for repair of the defect. However, when there is a rigid calcified scar this procedure may be impossible.

When an area of encapsulated fluid is present it is important to resect the wall of the cavity. Removal of the parietal pericardium over such an area will not have the desired effect.

The incision is closed by replacing the skin and muscle flaps without the use of drains. The danger of tamponade of the heart from the accumulation of serum does not seem to be very great. After the operation an oxygen tent is used routinely. Blood transfusions are not given as the author believes they may cause cardiac dilatation.

Churchill reports 10 cases in which the described operation was performed. Six of the patients were cured, 3 were benefited, and 1 died. By "cured" is meant restoration of the ability to resume normal functional activity. In the cases of boys this means the ability to participate in athletics such as football. In 2 cases in which the author operated for active tuberculous pericarditis the mortality was 100 per cent.

FARL O. LATIMER, M.D.

### ESOPHAGUS AND MEDIASTINUM

McGibbon, J. E. G. The Clinical Manifestations of the Spread of Carcinoma of the Esophagus Observed During Life. *Brit J Surg*, 1936, 24, 86.

The results of the treatment of esophageal cancer, like those of the treatment of cancer elsewhere in the body, depend upon the time of diagnosis and the virulence of the growth. A review of a large number of reports shows that the time which elapses before the patient comes to the surgeon ranges from six to eight months, and that in a considerable number of cases treatment for such conditions as nervous spasm and dyspepsia is given, sometimes even for months, before the correct diagnosis is made.

While varying in type and behavior, carcinoma of the esophagus is not so frequently of low virulence and long duration as was formerly believed. In a large series of cases the duration of life after the development of the first symptoms varied from four and seven tenths to ten and five tenths months. Patients with carcinoma of the esophagus show a more marked reaction to serological tests than those with carcinoma elsewhere.

The author describes 4 modes of spread of carcinoma of the esophagus: (1) direct extension, (2) lymphatic permeation and embolism, (3) extension by way of the blood stream, and (4) implantation.

Of 100 cases of esophageal cancer, the lesion was in the upper third of the esophagus in 17 per cent, in the middle third in 47 per cent, and in the lower third in 36 per cent.

McGibbon describes the lymphatic drainage of the esophagus. The findings of experimental studies indicate that spread of esophageal cancer by way of the lymphatics is at first slow and difficult, but that,



Roentgenogram showing 2 malignant strictures of the esophagus.

when once it has broken through the first layer, invasion is widespread and comparatively rapid.

The first symptom of cancer of the esophagus is usually dysphagia. Tumors located in the upper third of the esophagus may involve one or both of the recurrent laryngeal nerves. Hiccup is sometimes caused by involvement of the phrenic nerve with accompanying paralysis of the diaphragm and massive collapse of the lung. Perforation of the tracheobronchial tree is usually characterized by cough, hemoptysis, dyspnea, and terminal pneumonia.

The hope is entertained that through wider recognition of the gravity of abnormalities in the act of swallowing, the necessary examinations may be made earlier and the diagnosis established at a time when intervention will be possible. The author emphasizes that the investigation of cases of such abnormalities is not complete without endoscopic examination.

He divides the clinical course of carcinoma of the esophagus into 3 periods: (1) the latent period, (2) the symptom period, and (3) the manifest period.

WILLARD I. ARBUCKLE, M.D.



# SURGERY OF THE ABDOMEN

## ABDOMINAL WALL AND PERITONEUM

Uggeri C Congenital Femoral Hernia (Sullernia crurale congenita) *Ann Ital di chir* 1936 15 371

Uggeri reports a femoral hernia in a girl eleven years old

The puriform sac was directed upward and outward and was found adherent to the superficial epigastric vessels. The broad ligament was inserted into it and the ureter lay posterior to it. A small encapsulated lipoma was situated at the fundus. The sac wall was transparent and elastic, without a fatty covering and on histologic examination was found to consist of an extremely thin membrane of endothelial cells beneath which there was a narrow layer of connective tissue. This structure and the absence of a fatty layer excluded the possibility that the sac was part of the pelvic peritoneum.

The author next presents a critical discussion with references to reported cases of the arguments for and against the congenital origin of femoral hernia.

He concludes that while the great majority of such hernias are acquired, some are certainly congenital. The frequency of those of the congenital type has not been determined but they are probably numerous. The diagnosis of congenital origin is based on a combination of criteria: the age at which the hernia appeared, the characteristics of the sac (form, transparency, elasticity), the direction of its extension, its contents (ovary, tube, broad ligament), and the presence of a ureterocele. Observations are still too few to show the relative importance of the various signs, whether any of them are pathognomonic or whether the diagnosis of congenital origin can be made independently of the age of appearance of the hernia and when the sac has undergone secondary changes. In the author's opinion the histologic structure of the sac (which apparently has not been studied previously in congenital femoral hernia) is the most important single characteristic and a sure criterion of its congenital or acquired nature. However, secondary changes in a congenital sac may mask its primitive structure. The retrograde direction of the sac which is inexplicable by mechanical factors, and the relations of the sac to the vessels are also very significant. The other characteristics, when present singly, are of minor importance.

The origin of the peritoneal diverticulum is obscure. In the case reported by the author it appeared to be related to the vessel. Uggeri expresses the opinion that the presence of a ureter in a hernial sac is not excessively rare, but is often overlooked or not reported.

The article is accompanied by photographs and a bibliography.

M E MORSE MD

Falls L S Inguinal Hernia *Ann Surg*, 1936 104 403

The author reviews 1,600 consecutive operations for inguinal hernia performed on 1,247 patients at the Henry Ford Hospital, Detroit, in the period from 1920 to 1929. Only 27 (1.1 per cent) were performed on women. The youngest patient was three weeks old and the oldest eighty-nine years. Both of these had a strangulated hernia. Over 80 per cent of the patients were in the third, fourth and fifth decades of life, the period of greatest physical activity.

One hundred and fourteen (7.1 per cent) of the operations were performed on obese individuals whose excess fat in the subcutaneous and extra-peritoneal tissues made the operation technically more difficult, lengthened the operative time, and increased the risk of infection. Of 66 recurrences, 7 (10.5 per cent) occurred in patients who were overweight.

Thirteen hundred and twenty (82.5 per cent) of the operations were performed on persons engaged in occupations which required heavy lifting. Of the 66 recurrences, 59 (90 per cent) occurred in patients who earned their living by hard physical labor.

Nine hundred and ninety-four (62.1 per cent) of the operations were performed on patients who gave a definite history of injury.

Almost one half of the operations were performed within six months after the development of the hernia, over 60 per cent within a year, 20.9 per cent within from one to five years, and 13.7 per cent after more than five years. The time interval between the occurrence of the hernia and the operation had no appreciable bearing on the recurrence rate.

The claim that the wearing of a truss tends to weaken the tissues of the inguinal region by its continuous pressure, thus making repair less satisfactory, was not borne out, for of the 66 patients with recurrences, only 12 (18.2 per cent) had worn a truss.

Twenty-two (1.4 per cent) of the operations were performed for incarcerated hernias. Of this number, intestinal resection was necessary in only 1.

The total number of hernias occurring on the right side exceeded the total number occurring on the left side in the ratio of 6.5. Recurrence was more common on the left side (38 cases) than on the right side (28 cases). Three hundred and fifty-three (28.3 per cent) of the 1,247 patients had bilateral hernias.

Ethylene and ether anesthesia was used in 524 (32.8 per cent) of the operations, ether anesthesia in 475 (29.7 per cent), ethylene anesthesia in 359 (22.4 per cent), spinal anesthesia in 129 (8 per cent), nitrous oxide ether anesthesia in 77 (4.8 per cent), and local anesthesia in 36 (2.3 per cent). At the

present time, however, spinal anesthesia is used in over 90 per cent of herniotomies because of the perfect relaxation it produces.

Only 15.7 per cent of the hernias were of the direct type. The saddle bag type was found in 7.9 per cent of the operations. Sliding hernia was found in 3.3 per cent.

A hernial sac of moderate size was found in 1,040 (65 per cent) of the operations, a small hernial sac in 284 (17.7 per cent), and a large hernial sac in 276 (17.3 per cent). Forty-one of those of moderate size, 14 of the small hernias, and 11 of the large hernias recurred.

The sac was closed by twisting in 762 (47.4 per cent) of the operations, with recurrence in 27 by continuous straight suture in 335 (21 per cent), with recurrence in 20, by pursestring suture in 253 (16 per cent), with recurrence in 11, and by transfixation in 197 (12.3 per cent), with recurrence in 6. In 53 (3.3 per cent), the sac was not opened. Of these, 2 recurred. The author states that in considering the merits of these procedures it should be remembered that transfixation is used only for small hernias and that straight suture is employed for large direct hernias. The record of the pursestring suture is excellent, its wide adaptability being taken into account.

The Halsted operation was performed on 1,386 (88.6 per cent) of the total number of hernias. Of the 673 patients subjected to this operation who were traced, 55 (8.3 per cent) showed a recurrence. The Bassini operation was performed in 214 (13.4 per cent) of the cases. Of the 127 patients traced after this procedure, 11 (8.6 per cent) had a recurrence. In indirect hernias the essential step in the operation is high removal of the sac. In cases of direct hernia special attention must be given to repair and reinforcement of the floor of Hesselbach's triangle. Repair of the transversalis fascia is also of importance. Small hernias in young adults can be cured without transplantation of the cord. In cases of indirect hernia occurring in fat persons and persons past middle age and in those in which the sac is large, transplantation of the cord is essential for success.

In 1,545 (96.6 per cent) of the operations the suture material was silk. In the remainder, chromic catgut was used. Fascial sutures were not employed.

Three hundred and fifty-three (28.3 per cent) of the patients had bilateral operations, and 43 (6.5 per cent) of the 66 recurrences followed bilateral operations. Thus, while only one-fourth of the patients had bilateral operations, two-thirds of the recurrences occurred in this group.

At the time that 166 (10.4 per cent) of the herniotomies were done other operations were performed in addition. One hundred and five (63.3 per cent) of the other operations were for the correction of conditions existing in the genitalia.

Eighty-three (5.2 per cent) of the total number of operations were complicated by a variety of conditions. The most frequent postoperative compli-

cations were pulmonary affections which occurred in 33 (2.7 per cent) of the patients. This complication was also the most serious, being responsible for the 3 deaths which occurred, a mortality rate of 0.24 per cent. Wound infection occurred in 16 cases, hydrocele in 14, hematoma in 13, testicular atrophy in 4, and phlebitis in 3.

One-half of the recurrences occurred within one year, and one-third of them occurred more than two years after the operation. In cases of indirect hernia the recurrence rate was 7.4 per cent, and in cases of direct hernia 11.6 per cent. The recurrence of a hernia after operation is usually due to a technical error on the part of the surgeon.

CHARLES BARON, M.D.

#### Shambaugh, P. Peritonitis as a Factor in the Mortality of Gastro-Intestinal Surgery. *Ann Surg.*, 1936, 104, 382.

The observation that peritonitis is a frequent cause of death following operations on the gastrointestinal tract has led to the assumption that contamination of the peritoneal surfaces with intestinal contents during the operative procedure is responsible for the condition. To combat it, peritoneal vaccination to increase the resistance of the peritoneum to contamination and various more or less complicated "aseptic" methods of anastomosis have been proposed. Against the theory that operative soiling is the important cause of fatal peritonitis is the fact that the natural defensive powers of the peritoneum are sufficiently great to withstand a considerable degree of bacterial contamination, provided the bacteria are not extremely virulent and the inoculation is not prolonged.

The author reports an investigation which he carried out in the cases of 91 patients treated at the Peter Bent Brigham Hospital, Boston, to determine the relative importance of peritonitis as a cause of death following operative procedures on various parts of the gastrointestinal tract. Twenty-three of these patients died of peritonitis.

Of 25 patients coming to autopsy after gastric surgery, 13 were subjected to gastric resection, 9 to gastrotomy, and 3 to gastrotomy and pyloroplasty. One was treated by gastrostomy. Eight of the operations were performed for peptic ulcer and 17 for cancer of the stomach. Eight of the deaths were due to pneumonia, 4 to circulatory failure, 3 to pulmonary abscess, 2 to pulmonary embolus, 4 to obstruction hemorrhage, duodenal fistula, and septicemia from hypodermoclysis respectively, and 4 (16 per cent) to peritonitis.

Of 14 patients who came to autopsy following surgery on the small bowel, 7 died of pneumonia, 4 of circulatory failure, 1 of parotitis, and 2 (14 per cent) of peritonitis.

Of the patients subjected to surgery of the large bowel, 52 came to autopsy. Of the latter, 48 were operated upon for carcinoma. Death was due to pneumonia in 19 cases, circulatory failure in 9 cases, intestinal obstruction in 4 cases, pelvic cellulitis and

septicemia in 2 cases, pulmonary embolism in 1 case and peritonitis in 17 cases (33 per cent)

It is of interest that pneumonia not peritonitis, was the most important cause of death following gastro intestinal surgery. This was true even in cases of surgery of the large bowel. Hence it is apparent that measures to prevent postoperative pneumonia are of at least as much importance as measures to prevent peritonitis. Such measures should include avoidance of surgery in the presence of infections of the upper respiratory tract, siting the patient up in bed very early after operation, turning him frequently, getting him out of bed as soon as possible, cardiovascular stimulation when indicated, and, possibly, hyperventilation by means of carbon-dioxide inhalations.

In only 6 of the 23 cases of fatal peritonitis reviewed could the condition be attributed to contamination of the peritoneal surface at operation.

In the prevention of fatal postoperative peritonitis accurate suturing with careful attention to the blood supply is of greater importance than strict asepsis. Because of the great resistance of the human peritoneum to bacterial contamination operative soiling of the peritoneum unless massive rarely causes fatal peritonitis.

JOHN W. NELSON M.D.

#### GASTRO-INTESTINAL TRACT

Meltzer, H. and Spier, W. The Problem of the Pre Operative Treatment of Severe Cases of Pyloric Stenosis. (Zur Frage der Operationsvorbehandlung hochgradiger Pylorusstenosen). 60. Tag d. deutsch. Ges. f. Chir. Berlin 1936.

That patients with high grade pyloric stenosis who vomit very frequently are in a state of chloride deficiency sometimes even in danger of developing gastric tetany and that they require the parenteral administration of sodium chloride especially before any operative procedure is well known. However it is not well known that in such patients an acute life threatening hypochloremic condition may be brought about simply by the infusion of an ordinary isotonic solution of glucose. Such an observation which is of practical importance and very interesting from the theoretical standpoint was made by the authors at the Schmieden Clinic in Frankfurt.

The patient was a man thirty five years old who had suffered from stenosis of the pylorus for three years. He had vomited daily for several weeks and came to the Clinic for operation in a condition of starvation and dehydration. Tetanoid phenomena in the form of fibrillary hyperexcitability were noted and the Chvostek and Trousseau phenomena were present. As the patient was extremely thirsty and hungry he was given an intravenous continuous drop infusion of a 5 per cent solution of glucose. After about 1 liter of the solution had been introduced into the vein the first half more rapidly than the last, he suddenly lost consciousness. The respiration became shallow and the pulse scarcely

discernible, and a deep comatose inspiration was taken only occasionally. At first there was extreme motor restlessness but a death like immobility quickly supervened. As soon as these phenomena were observed the administration of the glucose solution was stopped and normal sodium chloride solution was given intravenously. After about half an hour the pulse and respiration were improved and after an hour and a half consciousness returned. After about four hours the patient was again able to speak.

In the authors' opinion the phenomena described may be explained as follows:

The patient was suffering from marked chloride deficiency. The chloride content of the tissues as well as of the blood was reduced to the minimum necessary for life and the balance could be disturbed very easily by the slightest accident. As the result of the intravenous administration of glucose solution the blood was considerably diluted and its concentration of chlorides was decreased. To increase the concentration of chlorides in the blood chlorides from the tissues were liberated into the blood stream with the result that the tissue chlorides were decreased below the level necessary to sustain life. It was upon this theory that the administration of normal sodium chloride solution was based.

To prove the correctness of their theory the authors produced an analogous condition and made determinations of the chloride content of the blood in animals. In dogs of middle size chloride deficiency was produced by the formation of a gastric fistula. The test was begun after the chlorides had been diminished by about one third of the highest value. Five hundred cubic centimeters of isotonic glucose solution were introduced intravenously over a period of about two hours. After the first hour the chloride content of the blood showed a considerable decrease and after the second hour it had dropped to from 43.5 to 44 per cent of the value at the beginning of the test. At the beginning of the second hour the animals became first restless and then comatose. When the administration of the glucose solution was stopped and physiological salt solution was given instead they soon appeared to be normal again and the chloride value in the blood rose to the level at which it was when the experiment was begun.

The authors believe that by this experiment they proved that the concentration of chlorides in the blood may be lowered appreciably and even to a dangerous degree merely by the infusion of a solution free from chlorides.

In several other cases of pyloric stenosis in which they employed glucose solution with care the results were unexpectedly irregular. The results in 2 of them are shown by curves. They demonstrate that in patients without a marked chloride deficiency the chloride concentration of the blood is not always decreased. This fact probably explains why even in the presence of chloride deficiency glucose solution can usually be given with impunity.

The case reported in this article and the authors' experiments on animals show that the danger associated with the infusion of glucose solution in the presence of chloride deficiency may be eliminated by giving sodium chloride solution before, or with, the glucose solution

LEO A. JUNKER, M.D.

Baum, S. M. Esophageal Gastric Carcinoma Successfully Treated by Protracted Fractional X-Ray Six-Year Survival. *Radiology* 1936, 27 53

After briefly discussing various aspects of carcinoma of the esophagus such as its incidence, most frequent anatomic location, pathologic classification, diagnosis, and surgical and irradiation treatment, the author reports the case of a patient who was treated in March, 1929, and has now remained well for six years. In this case the carcinoma involved the lower end of the esophagus and the cardiac portion of the stomach and was of the squamous cell type with hornification. The treatment consisted in the administration of high voltage x ray therapy by the protracted fractional method without preliminary gastrectomy. The technical factors were 200 kv, filtration by 2 mm Cu and 1 mm Al, 4 ma, a skin focus distance of 70 cm, and portals 400 sq cm. Cross firing was done through upper abdominal and right and left oblique portals. Each portal received about 5,000 r. Forty two treatments were given over a period of 69 days. The average dose per treatment was 480 r. A radio epidermitis was produced on each portal.

The good result is attributed by the author to the limited extent and relative radiosensitivity of the growth, the fractionation of the x ray dose, and the length of the period during which the irradiation was given.

T. LEONETTI, M.D.

Maignot, R. The Surgical Treatment of Irremovable Cancer of the Pyloric Segment of the Stomach. *Ann. Surg.*, 1936, 104 161

Maignot states that in fewer than 30 per cent of his cases of cancer of the pyloric segment of the stomach is radical cure found possible on exploration. When the growth cannot be resected the aim of any operation undertaken is to prevent death from starvation, to prolong life and render the patient more comfortable so far as his digestion is concerned, and to ward off, or at least postpone, such complications as profuse hemorrhage, perforation, or severe toxemia.

Although hitherto the operation recommended for the type of case under discussion was posterior or preferably, anterior gastrojejunostomy, some operation based on the principle of Devine is now more generally performed for the following reasons:

1. The death rate is no higher than that following the simpler short circuiting operation. In the author's 13 cases there was no immediate mortality.

2. The length of survival is increased. After gastrojejunostomy the length of survival is usually four or five months longer than after simple explora-

tion. By the procedure advocated, it may be increased by several months or in exceptional cases, even years.

3. The patient is prevented from dying of obstruction, as the gastro enteric stoma is very large and at a considerable distance from the primary growth, and the latter is excluded. When gastrojejunostomy is performed the stoma is apt to become occluded by the growth, which spreads into the body of the stomach from the pyloric region, or to become compressed by metastatic nodes in the mesocolon or great omentum.

Moreover, in the performance of gastrojejunostomy there is a tendency to place the opening too high up in the body of the stomach in order to make the anastomosis as far as possible from the involved portion of the stomach. The stoma therefore often functions poorly and gives little relief.

4. The immediate postoperative results are eminently satisfactory. It is at once possible to administer fluid nourishment by mouth in unstinted quantities, the appetite is restored, cachexia disappears, and the general health is greatly improved. The improvement in the general condition is often so marked that in the cases of some patients who survive longer than a year doubt may arise as to the correctness of the diagnosis made at the time of the exploration.

The technique is described in detail. It consists of transection of the body of the stomach, exclusion of the pyloric segment, and end-to-side gastrojejunostomy by the antecolic or retrocolic method.

CARL R. STEINER, M.D.

Erickson, R. J. Intestinal Tuberculosis. *Rev. Gastroenterol.*, 1936, 3 238

Intestinal tuberculosis is the most frequent complication of pulmonary tuberculosis and develops to some degree in the majority of fatal cases of the latter condition. Often it is the factor determining the outcome of tuberculosis of the lungs. Pulmonary tuberculosis frequently reaches an advanced stage without marked pulmonary symptoms, intestinal symptoms dominating the picture.

In past years the attitude toward intestinal tuberculosis was very pessimistic. In general this was true also of the attitude toward pulmonary tuberculosis. We know now that in most early cases recovery will result if proper treatment is given. While the onset of intestinal tuberculosis is very serious and the hope of cure is slight when this condition is associated with advanced tuberculosis of the lungs, the author believes that large numbers of patients with pulmonary tuberculosis pass through a period of intestinal involvement without serious symptoms and without a positive diagnosis.

Secondary intestinal tuberculosis is present in about 75 per cent of cases of pulmonary tuberculosis. Erickson found bowel lesions in 71 of 107 cases. He believes that intestinal involvement would be discovered much more frequently if extensive microscopic examinations were made.

The earliest visible lesions of intestinal tuberculosis occur in the lymphoid follicles of Peyer's patches. These nodules finally caseate and break through the mucosa. Necrosis takes place around the edges of the patches and the bacilli are carried by the lymphatics to adjacent areas. In the terminal ileum the ulcers are apt to follow the outlines of Peyer's patches and assume a longitudinal oval outline transverse to the lumen of the bowel. Perforation into the free abdominal cavity is relatively rare occurring in only about 3 per cent of cases. The perforation is often sealed off by fibrinous exudate.

Tuberculous processes are of 2 types: the exudative in which the tissues are markedly allergic to the product of infection and respond with an acute inflammatory and destructive reaction and the proliferative in which the body is less sensitive and responds with marked evidence of fibrosis and reparative processes.

The most common symptoms of intestinal tuberculosis are pain and diarrhea. However they are usually too variable to be of great aid in the diagnosis. The most common site of ulcerations is the terminal portion of the ileum. When the lesion is limited to the small intestine, the most common symptom is pain. In cases of combined and more extensive lesions diarrhea is more frequent and the symptoms are increased in severity and number.

X-ray examination which will reveal local spasm, hypermotility or a filling defect in the cecum constitutes the best diagnostic method today. For lesions above this area in the small bowel no accurate diagnostic method is yet available.

Tuberculosis of the intestine is curable, but its prognosis depends largely on the condition of the pulmonary lesions. Ultraviolet light and a diet high in vitamins C and D are of great value in the relief of symptoms and cure of the disease. Every effort must be made to prevent the swallowing of bacilli laden sputum and to render the sputum negative as soon as possible. JOHN W. NUZZO, M.D.

Comessatti G. Roentgenological Observations on Intestinal Tuberculosis (*Osservazioni radiologiche sulla tubercolosi dell'intestino*). *Radiol. med.* 1936 43: 577.

Comessatti presents a critical review of present day roentgenological knowledge of intestinal tuberculosis and reports his observations in 35 cases. In the majority of his cases the intestinal tuberculosis was a complication of pulmonary tuberculosis and in all of them the lesions were advanced.

Comessatti's findings confirm those of other investigators as to the law of parallelism between the clinical and pathological type of the pulmonary and associated intestinal tuberculosis, the comparative frequency of localization of tuberculosis in the various segments of the bowel and the high mortality in cases of intestinal tuberculosis complicating pulmonary tuberculosis. In his roentgenological studies a common finding in the diffuse ulcerative form of intestinal tuberculosis accompanying ad-

vanced pulmonary lesions was parietic dilatation of single isolated loops of the small intestine, usually the ileum, for a considerable period of time. This was invariably accompanied by ulceration of the cecum. In some of the cases with advanced pulmonary tuberculosis loops of the jejunum showed dilatation due to stenosis lower down. In cases with ulcers of the small intestine the passage of the opaque meal was usually delayed, whereas in those of tuberculosis of the ascending colon the passage of the meal through the colon was hastened. The total time of transit was either normal or increased. Pseudostasis in the ileum and Fleischner's paradoxical cecal residuum were often observed. In all cases in which the lesions were diffuse and the small intestine was involved the patient was cachectic.

In 1 case the stenotic syndrome disappeared spontaneously under prolonged medical treatment and actinotherapy. In the case of a patient with tubular stenosis of the ascending colon and the proximal part of the transverse colon ileotransversostomy gave good results.

Roentgen findings suggesting intestinal tuberculosis is localization of lesions in the ileocecal region with involvement of the last loop of ileum and signs of irritation of the colon and absence of a sharp differentiation between the affected parts of the intestine and the adjacent tissues. However in secondary tuberculosis of the intestines the decisive factor in the diagnosis is the presence of tuberculosis elsewhere in the body and in primary tuberculosis of the intestines the discovery of tubercle bacilli in the feces.

Roentgen examinations for intestinal tuberculosis should include a study of the functional disturbances and exploration for signs of involvement of the peritoneum and mesentery. Of the greatest importance is the early diagnosis of minimal direct signs of lesions of the small intestine and colon. As these are difficult to recognize the roentgen findings as a whole including the indirect and functional signs must be analyzed.

If non-stenosing intestinal tuberculosis is diagnosed early and subjected to medical treatment including actinotherapy and a diet rich in vitamins the outlook is encouraging. However the first element in success is arrest of the pulmonary focus. Reciprocally early treatment of the intestinal complications will greatly improve the pulmonary condition. In every case of pulmonary tuberculosis except perhaps the very early and favorable cases the examination should include a systematic roentgen exploration of the intestinal tract.

M. E. MOX & M. D.

Grégoire R. Infarction of the Intestine Caused by Anaphylactic Shock. (*Infarctus de l'intestin par choc d'intolérance*). *J. de chir.* 1936 45: 305.

Infarction of the intestine due to occlusion of the vessels must be distinguished from forms without a vascular lesion. There are reports of a number of cases of supposed thrombosis of the mesenteric

vessels too extensive for resection in which rapid and complete recovery followed exploratory operation. Such cases cannot be explained on the basis of vascular thrombosis. Several explanations have been suggested. The author rejects the mechanical and infectious theories as he believes the condition is due to a variety of anaphylactic shock. He cites a case in which Couvreur found a loop of bowel apparently gangrenous due to supposed mesenteric thrombosis. During the operation, adrenalin was injected hypodermically. Thereupon the circulation in the affected loop quickly returned to normal and the general condition improved. The patient rapidly recovered. Gregoire suggests that the entire picture of such a case can be explained as an anaphylactic reaction.

He has tried to reproduce the condition experimentally. In experiments on dogs which were sensitized to horse serum the abdomen opened under local anesthesia and injections of the serum were made into the mesenteric vessels, the wall of the intestine, and the superior mesenteric artery. Intense spasm of the vessel or of the local area of bowel but no gangrene resulted. However, when repeated injections of the horse serum were made in the same loop of intestine at suitable intervals, the Arthus phenomenon was produced: the animal apparently went into shock, the mesenteric vessel supplying the injected loop ceased pulsating, the veins became distended with black blood, and the intestine became blue black and apparently gangrenous. The author gives the protocols of 7 experiments. Further evidence in support of his theory is the fact that agents which tend to relieve anaphylactic shock are apparently efficacious in the condition under consideration—especially adrenalin given hypodermically and general anesthesia. He cites a case in which Lafargue exteriorized an apparently gangrenous loop of bowel and saw it change in color and return to normal after the hypodermic injection of adrenal n.

In his discussion of the mechanism of shock in the production of intestinal infarction the author's remarks are mostly general and do not explain how the condition occurs suddenly in an otherwise apparently normal individual. He states that the diagnosis may be impossible without laparotomy. Operation should be done to exclude other disease but it should be borne in mind that general anesthesia alone may be of value in the treatment. When infarction of the intestine is found, anti shock treatment should be instituted. If the circulation in the affected loop improves the loop can be safely re placed in the abdomen and the abdomen closed.

MAX M. ZININGER, M.D.

Somervell, F. H., and Orr, I. M. Some Contributions to the Causation Pathology, and Treatment of Duodenal Ulcer and Its Complications. *Brit J Surg*, 1935 23 227.

Peptic ulcer is approximately 600 times more common in Southern than in Northern India, but in the

State of Travancore, which comprises the southern 200 miles of the west coast of South India, its distribution is not uniform. In the extreme south of the State it is comparatively rare. On the east coast it is less common than in the inlands, and in the north, especially in the central half of the country, it is very prevalent. The fact that its incidence is lowest in the part of Travancore which has the densest population (the southern one-third) seems to indicate a dietetic cause, as does its high frequency in the parts of India where tapioca is eaten.

It is of interest that the inhabitants of the Unnevell district of South India, who used to be almost free from duodenal ulcer, have recently adopted the habit of eating tapioca root and are now developing the lesion with increasing frequency. The great majority of those with ulcer live on tapioca and rice, an almost exclusively carbohydrate diet with a low vitamin content. Meat and fish are rarely taken. Cream eggs, and most fruits are luxuries used only by the well to do, who are not typically the class with peptic ulcer. Vitamins A, B and C are especially deficient in the diet of the Travancore poor man. In persons living on this diet the incidence of duodenal ulcer is 800 times greater than in the northern Punjab, where the people are said to have one of the best balanced diets in the world. In Travancore itself, peptic ulcer is much more common in the central part of the State, where tapioca and rice constitute the staple diet, than in the southern portion, where a larger variety of vegetables with rice and little or no tapioca is eaten.

In the barracks of the State troops of Travancore, where the diet is well controlled, duodenal ulcer almost never occurs, yet the men come from villages where approximately 1 per cent of the population develop the lesion.

On the seacoast, peptic ulcer occurs only in the coolies working in the fields in the inlands. In the fisher folk who live by the sea and eat fresh fish it is very uncommon.

These facts suggest that the high incidence of duodenal ulcer in Travancore is probably due to Vitamin A deficiency. In 1927 McCarrison reported that of rats fed the Madras diet for six hundred and seventy five days 21.1 per cent developed gastric ulcer, and of rats fed the Travancore diet (tapioca, rice, chilies, pepper, and small amount of fish) for the same length of time, 27.7 per cent developed gastric ulcer and 11.1 per cent a severe duodenitis, whereas well fed control rats did not develop ulcer. The findings are in agreement with the authors' clinical observation that gastric ulcer is relatively far more uncommon in the Madras district than in Travancore, where duodenal ulcers outnumber gastric ulcers by 33 to 1.

The duodenal ulcers occurring in Southwestern India show several atypical characteristics although the incidence of gastrojejunal ulceration after gastroenterostomy is exactly the same there as elsewhere. The most striking feature is the rarity of perforation. Of a series of 2,500 ulcers, perforation occurred

in only 4. Hemorrhage is also very rare. These exceptional features are consistent with the very striking tendency of the Indian abdomen to develop chronic rather than acute ailments. The duodenal ulcer tends to be chronic rather than acute. Large cicatrized masses of scar tissue with stenosis of the duodenum and tremendous dilatation of the stomach are extremely frequent. This condition is seen in over 40 per cent of all cases of ulcer of the duodenum and pylorus in Southern India.

Of 443 cases of duodenal ulcer treated by gastroenterostomy postoperative gastrojejunal ulcer occurred in 23. In 16 its presence was proved surgically and in the remaining 7 was strongly suspected. The incidence of gastrojejunal ulceration after gastroenterostomy was therefore 6 per cent.

In the choice of operation the emptying time is important. The authors have found that a duodenal ulcer which is definitely tender on palpation and associated with rapid emptying of the stomach and hyperchlorhydria is best treated by a gastrectomy of the Finsterer type. Other surgical procedures are likely to be followed by a jejunal or gastrojejunal ulcer. However if there is delay in gastric emptying the operation of choice is gastrojejunostomy unless the gastric acidity is very high. In gastrectomy the practice of leaving behind a portion of the pyloric end of the stomach has been adopted. The authors state that this results in a free secretion of mucus in this region with which the ulcer is surrounded. This mucus will be a benefit to the intestine at the region of the anastomosis by decreasing the likelihood of recurrent ulcer. It is easier also to divide the stomach a slight distance away from the pylorus rather than close to it. Several of the deaths following gastrectomy were due to the difficulty in closing the pylorus near the sphincter.

Duodenal or pyloric ulcers are not attacked directly by the authors because every surgeon knows that excision of a duodenal ulcer can be one of the most precarious and difficult of all abdominal operations. They invariably heal if one way traffic is established by gastrectomy.

In the reviewed cases the mortality of gastrectomy was 6.5 per cent but most of the deaths followed resection for either gastric or gastrojejunal ulceration.

Gastrectomy on a stomach which is not itself ulcerated, adherent or inflamed is not a dangerous operation if it is performed properly. An operation with a 2 or 3 per cent risk is preferable to the alternative anastomosis with an operative risk of 15 per cent which is followed by recurrence in 6 per cent of cases and by disturbances of some sort in over 10 per cent.

SAMUEL J. FOGELSON, M.D.

**Bulmer E. Histidine Treatment of Peptic Ulcer.**  
A Study of 126 Cases with Immediate and Later Results. *Lancet* 1935 231 734.

Bulmer reports the results obtained in the cases of 126 patients with peptic ulcer who have been

treated with histidine since February, 1935. Patients with pyloric stenosis, possible malignancy or active or recurrent hemorrhage and those with no roentgenologically demonstrable abnormalities were excluded. Twenty-seven daily intramuscular injections of 5 c.c.m. of histidine were given. This was practically the only treatment, but the patients were not asked to discontinue their accustomed diet and alkaline powder.

Ninety-two of the patients were rendered symptom free, 6 were greatly benefited and 28 were not benefited. Of the 92 who were rendered symptom free, 26 remained symptom free for an average of sixteen months, 2 were greatly benefited, 15 had a relapse within three months, 20 had a relapse within six months, 10 had a relapse within twelve months and 3 had a relapse within twenty-four months.

The author draws the following conclusions:

1. Ambulatory treatment with injections of histidine gave at least as good results as ambulatory treatment with a dietary alkaline regimen.

2. Histidine therapy should be reserved for simple uncomplicated cases.

3. Recurrences do not appear to be influenced by a single course of injections of histidine.

4. At the present time histidine treatment should be regarded as an adjunct to simple dietary alkaline treatment.

5. The mode of action of histidine is unknown.

SAMUEL J. FOGELSON, M.D.

**Goodall J. R. Mucous Colitis.** *J. Obst. & Gynaec. Brit. Emp.* 1935 43 923.

Goodall reviews a recent series of 200 cases of mucous colitis which were under observation over a period of five years. He states that the diagnosis is very elusive because the symptoms are so frequently referred to other organs. He recognizes 3 main types of the condition: (1) simple colitis, (2) complicated colitis, and (3) referred colitis. (a) cardiac, (b) cerebral, (c) appendicular, (d) renal, (e) pulmonary, (f) cholecystic, (g) gastric, (h) pelvic, (i) rectal, (j) articular and (k) muscular.

In simple colitis the chief symptom is pain. The patient often gives a history dating back several years of a dull ache over the entire abdomen with waves of intensity aggravated by indiscretions in diet, severe nervous strain or sudden chilling of the body. When the pain becomes fixed and local it may be very difficult to exclude organic disease of other organs. When the cecum is involved the appendix is often thought to be the source of the trouble. The combination of colitis and appendicitis is not unusual. The most common site of the pain is the sigmoid. When the sigmoid is involved constipation is the rule and often dates back to childhood. In a certain number of cases the bowels move daily but the evacuations are incomplete. The great majority of patients report an excess of glairy mucus in the stools. When the cecum is the chief site of the trouble the stools are often scybala and covered with a coating of inspissated white mucus.

Frequently the mucus is blood streaked and a strong purgative may cause the passage of considerable bright red blood. The pain and tenderness may be greatly aggravated by the cathartic. Physical examination of the abdomen may be quite negative, but this is not the rule. In most cases there is tenderness, local or general. The cecum, transverse colon, or descending colon may be very tender and spastic. Often it is possible to trace the affected bowel, which feels like a rope, through a certain segment of the abdomen.

French investigators have shown that persons with colitis are unable to digest meat fiber. Unstriated muscle is frequently found in the stools in large quantities. A milk and cooked vegetable diet, with fruit, both raw and cooked, and with the later addition of eggs is the best remedy to overcome the supersensitiveness of the bowel and the growth of putrefactive agents. Water should be taken freely. All that is required in addition is mild catharsis with castor oil followed by the regular administration of a laxative and of a mild sedative to allay the intestinal supersensitiveness. Mild bile laxatives together with the barbiturates are most effective. Luminal is one of the best agents to decrease the sensitiveness of the autonomic nervous system and quiet the intestines. The patient should be cautioned against eating too rapidly. Iced drinks and condiments should be forbidden, and highly seasoned foods and roughage should be excluded from the diet. Relapses are common.

JOHN W. NUZZUM, M.D.

Mayo C. W., and Wakefield E. G. Disseminated Polyposis of the Colon. A New Surgical Treatment in Selected Cases. *J. Am. M. Ass.*, 1936, 107: 342.

The method of treatment which the authors describe seems to have qualifications which still further advance the care of selected patients who have multiple polyposis of the colon. The normal outlet of the rectum and its sphincters is preserved, and the rectosigmoid and sigmoid flexure, which contain the nervous mechanism controlling the desire to defecate, are left intact. Therefore sufficient room is left for the storage of fecal material. Primarily, the operation has been made possible by the development of improved instruments and improved technique on the part of proctologists. Mayo and Wakefield were assisted by Buie and his colleagues in the Section on Proctology at the Mayo Clinic, who removed the polyps from the rectum, rectosigmoid, and sigmoid in order that segments which were free of polyps might be utilized in performing an ileosigmoidostomy.

The first stage of the operation is performed by the proctologist who, with repeated applications of diathermy, removes a few polyps at a time as conditions permit until the rectum and rectosigmoid are free from polyps. The second stage of the operation is not performed until the rectum and rectosigmoid are free from polyps and the inflammation incidental

to their removal. This stage of the procedure, which is performed through a right rectus incision, consists of end to side ileosigmoidostomy and hemicolectomy, with removal of the right half of the colon and of as much of the transverse colon as can be removed with ease. In the performance of the ileosigmoidostomy care is taken to cut the ileum at an angle that insures not only a large stoma but also a good blood supply to the incised edge. The anastomosis is made along the longitudinal band with a serous layer of silk sutures and mucosal layers of sutures of chromic catgut. The angles of the anastomosis are protected with extra interrupted sutures of silk, which include epiploic tags whenever possible. The incised end of the remaining portion of the transverse colon, with a Pair clamp closing it, is brought out of the upper part of the right rectus incision after intra abdominal raw surfaces have been covered with peritoneum. A rectal tube is fixed in the rectum to allow free passage of liquid and gas.

The third stage, which is carried out as soon as conditions permit, consists of hemicolectomy again, this time performed through a left rectus incision with removal of the remaining portion of the transverse colon, the splenic flexure, and the descending colon. The amount of colon to be resected may be judged by palpation of the polyps. As the proximal portion of colon is brought out of the wound, which makes it possible to fulgurate when necessary through the colonic stoma at a later date, it may be possible to save more of the colon than has been reached from below with the sigmoidoscope. In performing resection of the transverse colon it is important to preserve as much of the omentum and its blood supply as possible.

The fourth stage of the operation consists of retrograde examination and fulguration through the abdominal colonic stoma.

The fifth step is closure of the colonic stoma, which re-establishes the continuity of the intestine.

Strangely, little if any fecal drainage occurs through this colonic stoma at any time before closure. It may be left as a safety valve for a while and closed later, after repeated examination has revealed that the remaining portion of bowel is free from polyps.

With regard to the type of case to which this procedure is applicable the authors state that it cannot be used when secondary inflammation has involved the entire colon. This condition is best treated by ileostomy and total colectomy in stages after the inflammation has subsided. The surgical treatment described is of particular value in cases in which the diagnosis is made before complications have developed, particularly when carcinoma has not involved the colon distal to the sigmoid flexure.

As soon as multiple polyposis of the colon is diagnosed and the described method of treatment is considered applicable, the first stage of the operation should be started. While this is admittedly a formidable surgical procedure, it is the only known way of guarding the patient against repeated in-



testinal hemorrhages and carcinoma. In most cases, instead of being a prophylactic measure the operation removes degenerated polyps and multiple carcinomas which are already present.

Of 10 patients under 41 years of age 12 were women and 7 were men. The hereditary and familial tendencies, if present, do not admit any known genetic or biologic interpretation. In 6 of the patients a carcinoma was the predominating lesion at the time of operation. It has been said that the development of carcinoma in these colons is inevitable that uncomplicated polyposis of the colon is symptomless and that diarrhea and blood in the stools are not signs of polyposis but evidence of serious complications such as secondary infection, ulceration or carcinoma. An ulcerative colitis may develop on an existing polyposis of the colon with subsequent disappearance of the polyps. The described new surgical procedure is designed to reduce the operative risk, conserve the distal segment of the colon and the entire rectum, and eliminate the necessity for permanent ileostomy.

Crocker W J and Valentine, E H. Hemography In the Diagnosis of Appendicitis Based on 500 Cases. *J Lab & Clin Med* 1936 21 883

The authors state that they have modified the Schilling classification of neutrophils and on the basis of a study of 500 cases of appendicitis treated at the Philadelphia General Hospital believe they can differentiate 8 degrees of appendicitis from the hemogram.

They describe the normal hemogram as consisting of 9 myelocytes, 0 juveniles, 4 stabs, 64 segmenters, a normal Schilling index of  $1/18$  or a multiple index of 1.

They believe that much valuable information is obtained from a comparison of the number of neutrophil types since a left shift with greater numbers of myelocytes and juveniles is indicative of a more serious state than a left shift consisting largely of stabs.

The 8 degrees of appendicitis they distinguish and the corresponding hemograms are as follows:

*First degree* or chronic tuberculous appendicitis. White cell count from 5,000 to 10,000 neutrophils from 40 to 70 total shift cells from 10 to 35, Schilling index from  $3/4$  to 1, and a left shift limited almost exclusively to stabs.

*Second degree* appendicitis including those conditions commonly classified as chronic inflammations of the appendix. Instead of inflammation, however, there may be degeneration, atrophy or hypertrophy. With vague symptoms and a history of recurrent attacks the hemogram is rather constant: white cell count from 10,000 to 15,000, neutrophils from 50 to 75, total shift cells from 15 to 35, Schilling index from  $3/4$  to 1, and multiple index from 5 to 17.

*Third degree* or acute suppurative early gangrenous appendicitis. With typical symptoms of acute appendicitis the hemogram is constant: white cells from 15,000 to 30,000 neutrophils from 75 to 95 total shift cells from 15 to 35, Schilling index from  $1/10$  to

$1/18$  multiple index from 3 to 16, and lymphocytes from 2 to 25.

*Fourth degree* or acute suppurative exacerbation of a chronic appendicitis. With a history of recurrent appendicitis and a present acute attack the findings are constant: white count from 7,000 to 15,000 neutrophils from 60 to 75 total shift cells from 35 to 60 lymphocytes from 20 to 40 Schilling index from 1 to 3, and multiple index from 16 to 48.

*Fifth degree* or acute suppurative appendicitis with rupture and a mass in the right lower quadrant of the abdomen walled off. In the presence of a history and symptoms of rupture of the appendix and a mass in the right lower quadrant of the abdomen the characteristic hemogram is: white count from 10,000 to 30,000 neutrophils from 60 to 90 total shift cells from 35 to 60 lymphocytes from 5 to 30 Schilling index from 1 to 3 and multiple index from 16 to 48.

*Sixth degree* or acute suppurative appendicitis without rupture. In the presence of a history of a first attack and acute symptoms the hemogram is as follows: white cell count from 7,000 to 30,000 neutrophils from 75 to 95 total shift cells from 35 to 60 lymphocytes from 0 to 20 Schilling index from 1 to 3, and multiple index from 16 to 48.

*Seventh degree* or acute suppurative appendicitis with rupture or impending rupture. In the presence of a history of a first attack and acute symptoms the hemogram is approximately as follows: white count from 6,000 to 35,000 neutrophils from 80 to 95 total shift cells from 60 to 75 lymphocytes from 0 to 15, Schilling index from 1 to 4, and multiple index from 27 to 64.

*Eighth degree* or acute suppurative appendicitis with rupture and diffuse peritonitis. White cell count from 5,000 to 40,000 neutrophils from 75 to 100 total shift cells from 75 to 100 lymphocytes from 5 to 25 Schilling index from 4 to 100 and multiple index from 64 to 1,600.

Representative shifts as shown by the tables are exemplified by the following:

Degree	Myelocytes	Juveniles	Stabs	Segmenters
1	0	0	19	39
2	0	0	26	40
3	0	0	22	62
4	0	0	43	28
5	0	0	43	20
6	0	0	52	33
7	0	0	61	30
8	4	12	60	8

L. W. CHRISTIAN, M.D.

#### LIVER, GALL BLADDER, PANCREAS, AND SPLEEN

Henningsen, O. A Clinico-Experimental Contribution on the Talma Operation (Klinisch experimenteller Beitrag zur Talmaschen Operation). *Beitr. - klin. Chir.* 1936 164 229.

The object of the Talma operation is to produce artificial adhesions of the omentum and spleen to

the anterior abdominal wall and thus provide a collateral route for the blood which otherwise would go to the liver. This is done to prevent congestion in the region of the liver. The operation is performed especially in cases of atrophic cirrhosis of the liver although it is still unknown whether the ascites is due to stasis alone or whether toxic or infectious influences also play an important part in its occurrence. The operation is performed also in cases of biliary cirrhosis, cardiac cirrhosis, and Curschmann's disease, even in cases of ascites due to cardiac insufficiency. When there is icterus indicating injury of the liver the prognosis is unfavorable. The operation is contra indicated also by vitium cordis with generalized hydrops. The only suitable cases are those in which there is interference with the portal circulation due to destruction of the central veins, i.e., cases of isolated portal stasis. The course of this condition is long. It is not until late that the chronic intoxication is manifested by ascites and bleeding from the digestive tract, particularly the esophagus (evidence of congestion in the region of the portal vein). After the appearance of these congestive phenomena the condition usually progresses very rapidly. The congestion can be relieved by the opening of new collateral channels. The functional state of the liver is also of importance. Icterus and acholia, xanthoma and pigmentation of the skin, and urobilinuria necessitate caution. With the beginning of icterus the prognosis rapidly becomes worse.

In an attempt to clear up this problem the author carried out experiments on animals. It is well known that experimental animals soon die when the portal vein is ligated before its entry into the liver. In experiments on 15 rats the author sutured the omentum intraperitoneally to the peritoneum over a large surface and placed the spleen in a pocket of the omentum. Ten days later he ligated the portal vein and severed it at the porta hepatis. The operation was well tolerated by all except 1 rat. The animals presented no differences from normal animals. However, it is possible that some of the blood reached the liver in spite of the developing collateral channels. The experiments prove merely that the portal circulation can be replaced by collateral channels by a procedure similar to the Talma operation. It is necessary only that the number of newly formed vascular anastomoses be large.

In another experiment, also performed on 15 animals, the functioning hepatic parenchyma was destroyed by the long continued administration of phosphorus, the omentum was then fixed, and finally the portal vein was ligated. All of the animals died in from 3 to 20 days.

In another series of animals the common duct was tied off with a catgut suture at the same time that the portal vein was ligated, about 10 days after fixation of the omentum. The animals became icteric the next day, and all of them died. The hepatic injury had such serious functional sequelae

that the animals were unable to overcome them despite the exclusion of the portal circulation. This was true also of icterus. It is therefore evident that, despite the formation of sufficient collateral channels such as those formed in these experimental animals, the progress of the disease is not always arrested. Therefore the Talma operation is not indicated in cases of severe injury to the liver with evidence of marked functional disturbances such as icterus and pronounced cholemia, and in cases of cirrhosis of the liver it should be done as early as possible, when the first signs appear. In cases of biliary cirrhosis of cardiac origin and in heart failure caution is necessary. On the other hand, in cases of Curschmann's disease, which is similar to atrophic cirrhosis of the liver, the operation may be attempted when the condition has an acute onset, and runs a slow course, and the patient can be kept under observation. When there is no indication of a slowing-up in the formation of ascetic fluid in spite of internal treatment and 1 or 2 paracenteses, the operation should be undertaken.

Spontaneous bleeding from the stomach and intestinal tract is an absolute indication for the operation, whether ascites is present or not. When severe hemorrhages occur from ruptured esophageal varices it is necessary, of course, to delay the operation to see if the patient will recover from the effects of the bleeding. The procedure must be very conservative. A small midline incision under local anesthesia is sufficient for either intraperitoneal or extraperitoneal fixation of the omentum. When the spleen is greatly enlarged a portion of the omentum should be sutured to its surface. In extraperitoneal fixation, abdominal hernia usually does not play an important role. The author disapproves of the suturing of loops of intestine together or of additional drainage of the abdominal cavity from the pouch of Douglas. He states that when the operation is performed in the presence of the indications cited and in the manner described the dangers are very slight. Therefore too much conservatism in the selection of cases is to be avoided. By the described treatment life can be prolonged and made more bearable for a period ranging from months to years. (ERICH HEMPEL) JOHN W. BRENNAN, M.D.

**Titone, M.** The Shape and Function of the Gall Bladder Before and After Appendectomy (Morfologia e funzionalità della vescichetta biliare prima e dopo appendicetomia). *Arch. ital. di chir.*, 1936, 44, 1.

Titone made a series of cholecystograms in 25 cases of subacute and chronic appendicitis before and at intervals of from eighteen to sixty days after simple appendectomy. None of the patients had symptoms referable to the gall bladder.

The findings in the subacute and chronic groups were similar. In some cases the appearance of the gall bladder was entirely normal both before and after operation. In others, before the operation, the gall bladder was in ptosis and unusually large,

its shadow was faint, and its contours were blurred. The rate of emptying was usually within normal limits but in a few instances it was either retarded or accelerated. These conditions are neither absolutely pathologic nor strictly normal, and are difficult to interpret.

After appendectomy changes in shape or motility, or both, were observed in some instances. These consisted usually in a decrease but occasionally in an increase in the size of the vesicular shadow and retardation or acceleration of the rate of emptying sometimes with changes in its beginning and rhythm. Differences in form and size were more pronounced than changes of position intensity of shadow or clearness of outline.

The findings demonstrate that an inflamed appendix can influence the shape and dynamics of the gall bladder in the absence of extrinsic or intrinsic anatomic lesions of the biliary tract and that removal of the appendix can modify pre-operative conditions. In some cases these repercussions are the expression of nervous connections between the appendix and biliary tract through the solar plexus. The appendix has no exclusive or characteristic action on the biliary tract. The relative frequency of its effects upon the latter is due to the relative frequency with which it is inflamed. These effects occur in only a rather small proportion of cases, probably only when the neurovegetative system is unusually labile. They vary according to the nature and intensity of the stimulus and whether it is chiefly vagal or sympathetic. Vagotable individuals are most often affected. In some cases however, the gall bladder changes are due to an attenuated inflammation of its serosa dependent upon an infective focus in the right abdomen most often appendicitis.

The reviewed cases are reported in detail with the cholecystograms and the article is followed by a bibliography. M. E. MORSE, M.D.

Illingworth, C. F. W. The Formation of Gall Stones. *Edinburgh M. J.* 1936 43 481.

Modern observations on the formation of gall stones may be said to have begun in 1892 with the publication of Naunyn's monograph entitled *Die Klinik der Cholelithiasis*. Naunyn expressed the opinion that differences in the structure or chemical constitution of the different types of gall stones are due to secondary changes taking place after the formation of the stones. He believed that all gall stones originate in stagnant bile as the result of a "lithogenous catarrh" of the wall of the gall bladder, and that their main constituents cholesterol and calcium salts are derived from cells of the mucous membrane which are shed into the cavity of the gall bladder as the result of the inflammatory process.

As at the time of Naunyn's work the majority of gall stones recognized clinically were accompanied by gross cholecystitis it is not surprising that infection was regarded as an essential factor in the stone-forming process. However more recent observations

have shown that this theory is not applicable to all gall stones although it is still held in modified form in regard to the common laminated "mixed" type of stone.

The modern conception of gall stone formation we owe to Aschoff and Baumeister. In their monograph *Die Cholelithiasis* they expressed the opinion that the great variations in appearance structure and chemical composition of the different types of stones are clear proof of different modes of origin. The solitary cholesterol stone, pure in color and chemical composition and almost entirely crystalline in structure, has nothing in common with the small black pigment concretions and the latter are entirely different in character from the common faceted or laminated stones of mixed composition. Therefore the causes and modes of origin of gall stones can be determined only by considering the different types of stones individually.

Illingworth recognizes 4 main types of stone: (1) single pure cholesterol stones, (2) multiple pure cholesterol stones, (3) pure pigment (bilirubin calcium) stones and (4) stones of mixed composition (cholesterol bilirubin calcium stones).

#### THE SINGLE CHOLESTEROL STONE

The single cholesterol stone has a quite distinctive appearance. It is ovoid or rounded smooth or some what nodular on the surface light in weight and pale yellow. It may become larger than a pigeon's egg. Its most striking characteristic is its radiate crystalline structure. When it is cut across or fractured, it is seen to be composed almost entirely of coarse yellowish or white crystals which are clearly visible to the naked eye. The crystals are disposed radially and extend from the center of the stone to its periphery.

In some cases the structure of the stone is crystalline throughout and chemical analysis showed that at least 95 per cent of its dry weight is due to cholesterol. In other cases a small amount of pigmented material is found in the interstices of the crystalline structure at the center of the stone.

Quite frequently as the result of secondary infective changes the originally pure solitary becomes coated with a shell of mixed deposits containing pigment and a variable amount of calcium. Stones of this type are known as a cholesterol combination stones and are often accompanied by multiple faceted stones formed at the time of the formation of their outer shell.

The author attempts to prove (1) that the cholesterol solitary is an aseptic formation, (2) that it is crystalline from the time of its origin and (3) that it is formed by the precipitation of cholesterol derived from the bile.

1. *The cholesterol solitary is an aseptic formation.* While many pure cholesterol stones are associated with cholecystitis especially in operative cases, this may well be due to the fact that such stones give rise to few symptoms when they are aseptic and demand surgical treatment only when secondary infection

has occurred. In a statistical summary of the findings in cases of gall stones coming to autopsy at the Leeds General Infirmary, Gross found that only 3.2 per cent of solitary cholesterol stones were accompanied by cholecystitis. Moreover, in an uncomplicated case of pure cholesterol stone the gall bladder is thin walled, free from adhesions, and of a normal blue green color, histological examination reveals no evidence of inflammatory change, and bacteriological investigation fails to demonstrate the presence of organisms. While it is possible that in such a case the formation of the stone may have been due to a transitory infection of the bile persisting long enough to set up the process of cholesterol precipitation and then disappearing completely, there is no proof of this.

2 *The cholesterol solitaire is crystalline from the time of its origin.* Meckel von Hemsbach, one of the earliest investigators to study the formation of the cholesterol solitaire, advanced the theory that, at first, the solitaire is an amorphous stone composed of mixed deposits and similar to the large, soft, brownish amorphous stones not infrequently found in inflamed gall bladders. As it is known that certain mineral deposits, primarily amorphous, tend in the course of centuries to assume a crystalline structure, Meckel von Hemsbach advanced the theory that amorphous gall stones may undergo a slow process of secondary cholesterolization whereby cholesterol crystals forming within the amorphous mold gradually displace the other constituents of the stone completely. Illingworth believes, however, that the outer crust is due to ineffective changes and is entirely a secondary deposit. In support of his opinion he states that stones not subjected to infective complications are invariably crystalline throughout, and the younger the stone the more certain it is to be entirely crystalline.

3 *The cholesterol solitaire is formed by the precipitation of cholesterol from the bile.* It was Naunyn's view that the cholesterol in gall stones is derived from epithelial cells from the surface epithelium of the gall bladder mucosa. However, while such cells undoubtedly contain a considerable amount of cholesterol, they must be very scanty except in catarrhal conditions and even in the latter could hardly form an adequate source for the large amount of cholesterol required for the building up of a large gall stone. Subsequent writers, modifying Naunyn's view, expressed the opinion that cholesterol is derived from secretion poured out from the gall bladder wall. It is now known, however, that, in health, the gall bladder secretes little or no cholesterol. On the other hand, the bile normally contains a large amount of cholesterol. The problem of cholesterol stone formation is therefore the problem of cholesterol precipitation from bile. Cholesterol precipitation is favored by any of the following changes in the composition of the bile: (1) an increase in the cholesterol content, (2) a decrease in the bile salt content, and (3) a qualitative alteration in the bile salts or in the combination of cholesterol and bile salts.

The cause of a change in the relative amounts of cholesterol and solvent substances may be found in either faulty secretion of the liver or secondary changes imposed on the bile in the gall bladder.

It is known that the amount of cholesterol secreted by the liver varies considerably and may be increased even 3 fold by simple starvation. It is known also that the amount of bile salts secreted is subject to great variations both in health and disease. It is reduced, for example, by a diet rich in sugar and to an even greater extent in conditions of liver impairment such as may be produced experimentally by the administration of chloroform or phosphorus.

Pure cholesterol stones are commonly found with cholesterosis of the gall bladder, itself a metabolic disorder. Moreover, it has been shown statistically that pure cholesterol stones are related to obesity and perhaps also to diabetes.

The crystallization of cholesterol from the bile is due to a change in the relative proportions of cholesterol and its solvent substances. The cholesterol becomes more and more highly concentrated and eventually precipitates. In its precipitation the presence in the bile of some particle capable of acting as a nucleus is probably of importance. Many pure cholesterol stones have a central area of pigmentation which may represent the original nucleus. It is possible that in some cases a mass of desquamated epithelial cells or even a clump of bacteria may be sufficient to start the process of crystallization.

As to the length of time required for the formation of a large pure cholesterol stone, little is known. However, it is generally thought that a pure cholesterol stone forms slowly and increases in size gradually over a period of months or years, and it is certainly true that the larger solitaires, 2 in or more in length, are found most often in elderly persons whereas the smaller and presumably more recently formed stones are more common in younger persons. When cut across, some large cholesterol stones exhibit concentric layers similar to those in the trunk of a tree, indicating intermittent crystallization.

#### MULTIPLE PURE CHOLESTEROL STONES

Like solitary pure cholesterol stones, multiple stones of this type appear to be aseptic in origin although cholecystitis may supervene before surgical treatment becomes necessary. Also like solitary stones they are often associated with cholesterosis of the gall bladder.

Multiple cholesterol stones vary considerably in appearance and structure, and without doubt originate in different ways. They are of 2 types.

1 Smooth regularly sized stones formed by crystallization of cholesterol from the bile. Multiple pigment nuclei at the time of crystallization are responsible for their multiplicity.

2 Irregularly sized lobulated "unripe mulberry" stones.

#### PURE PIGMENT STONES

Pure pigment stones are not common in Great Britain. Of 300 cases of gall stones studied, they

were found in only 5.6 per cent. They are generally multiple, small, rounded, and of a metallic hardness. Occasionally they become 1 cm. in diameter and are nodular like a blackberry, or irregular in shape. They are usually dark gray or black, and when cut across are seen to be homogeneous and composed of amorphous material. Chemical analysis shows that they contain bilirubin in combination with calcium. Cholesterol is generally lacking. Rarely stones of this type are greenish throughout because of the presence of biliverdin.

They are essentially aseptic formations, the result of the precipitation of bilirubin and calcium from the bile. They may be found in the gall bladder or the bile ducts, and it appears likely that they may originate in either site.

The presence of an excess of bilirubin seems to be one of the essential causative factors. Pigment stones are a common complication of such conditions as hemolytic jaundice in which there is excessive destruction of red blood cells and consequently an increase in the amount of bilirubin excreted by the liver. They may be formed also after partial or intermittent obstruction of the inflow of bile, though they are by no means always attributable to such a cause.

#### STONES OF MIXED COMPOSITION

The common gall stones are of a mixed composition. They consist of variable proportions of cholesterol, bile pigment, and calcium salts in addition to a considerable amount of albuminous matter and sometimes traces of iron, copper, and other metals. They have an amorphous, brownish center and a harder shell which is often laminated.

They are usually multiple, sometimes numbering several hundreds. When they are numerous they are faceted by mutual pressure. In some cases there is a single stone, perhaps forming an accurate cast of the shrunken gall bladder, or there are 3 or 4 barrel-shaped stones.

As Naunyn maintained, there can be little doubt that stones of this type are of infective origin. It seems most probable that they are formed by the interaction of bile and an inflammatory exudate (mucopus). According to Lichtwitz, the precipitation is determined by the fact that bile is an electro-negative colloid solution, whereas inflammatory exudate is electropositive, and when mixed they effect a mutual precipitation. As the process takes place rapidly, no crystallization occurs and the stones remain amorphous throughout. The composition of the stones varies according to the amount of bile present and the nature of the inflammatory exudate. Therefore the stones may be heavily pigmented or pale gray.

According to Aschoff, an essential factor in their formation is a temporary occlusion of the cystic duct by either an aseptic stone or an inflammatory edema. The obstructed infected gall bladder fills with mucopus, but no precipitation occurs as bile is absent. The stones are formed later when the obstruction of the cystic duct is relieved and fresh bile enters

the gall bladder and comes into contact with the mucopurulent content. JOHN J. MALONEY, M.D.

Sandblom P, Bergh G S and Fry A C. Cholecystoduodenostomy Combined with Pyloric Exclusion. *Ann Surg* 1936 104 702.

In experiments on dogs attempts to prevent ascending infection following bile-duct anastomosis by diverting the chyme so that it does not pass the anastomosis have been unsuccessful. To divert the chyme effectively, it is necessary to perform pyloric exclusion in addition to gastro-enterostomy. Even after pyloric exclusion, some of the ingested material makes its way back into the duodenal loop.

Ascending infection usually results in man as well as in animals following bile duct anastomosis, but as the factor of safety in the liver is so large, it rarely gives rise to clinical symptoms. Occasionally, however, a fatal infection ensues, especially if stasis of bile occurs. In some cases, the development of peptic ulcer constitutes an added danger. For these reasons it seems unwise to extend the indications for the operation.

In the presence of an irremovable obstruction in the terminal portion of the common bile duct, simple anastomosis of the gall bladder to the stomach or duodenum is a satisfactory operation. More complicated procedures add to the operative risk without presenting any definite advantages.

A normally functioning sphincter of Oddi or choledochoduodenal mechanism plays an important role in the prevention of cholangitis and dilatation of the bile ducts. SUMNER, F. VAN, M.D.

Elliot E, Jr. Benign Cicatricial Strictures of the Bile Ducts. *Ann Surg* 1936 104 668.

Partial or complete division of the common or hepatic duct in the course of cholecystectomy is unquestionably the most frequent cause of benign strictures, due to cicatricial tissue in the wall of the duct. Abnormalities in the course, length, and termination of the cystic duct and variations in the course, origin, and distribution of the cystic artery are important predisposing causes. The pressure of a hemostat on a portion of the duct wall may also be responsible for subsequent stricture. Benign strictures are usually associated with biliary fistulas.

The symptoms of a benign stricture occurring without a previous operation are usually those of the gradual development of jaundice with or without occasional attacks of cholangitis.

Benign strictures vary in their location and extent. Strictures of the hepatic duct just above its junction with the cystic duct usually follow cholecystectomy and are localized. Strictures in the common duct occur more frequently at or near the ampulla. Strictures due to peptic cholangitis are generally diffuse and may involve the greater part of both the common and the hepatic duct.

Operative measures which vary according to the location and extent of the stricture are of the following types:

1 End-to-end anastomosis after excision of the stricture. This may be done when the orifices of the duct can be approximated without undue tension.

2 Choledochoduodenostomy. This is done when the stricture involves the terminal portion of the common duct.

3 Hepaticoduodenostomy, hepaticogastrostomy, or hepaticojejunostomy. The indications for these procedures are strictures which involve such a large portion of the common duct that neither of the preceding operations is possible.

4 Reconstruction of a new duct by the tube method (Wilms).

5 Implantation of the biliary fistula into the stomach, duodenum, or intestine.

6 Cholecystoenterostomy. This is done in cases of stricture of the common duct in which both the gall bladder and the cystic duct are normal.

7 Dilatation of a stricture with the insertion of a buried tube.

8 Choledochotomy, or simple division of the stricture.

9 Hepatoenterostomy, the approximation of denuded liver tissue to the duodenum or small intestine. This is done when the stricture involves the hepatic duct within the liver and dilatation of the stricture cannot be carried out or has failed to give relief.

While striking results have at times followed each of these measures, with the exception of the last 2, failures are not uncommon. Either the stricture recurs within a year or a septic cholangitis of increasing intensity proves fatal. Recurrence of the stricture is less likely if in the operative anastomosis, the mucous membrane of the divided ends of the duct or of the duct and intestine can be approximated and sutured without tension. In the absence of infection conditions are then favorable for primary union, and if the line of suture is not torn apart in the later withdrawal of the tube from within the duct the stricture is not apt to recur.

An accurate estimate of the relative value of these operative procedures is impossible. In general, the selection of the more simple operation is indicated. When practicable, end-to-end anastomosis after excision of the stricture affords an excellent chance of success. In strictures of the common duct, choledochoduodenostomy or hepaticoduodenostomy, especially when the mucous membrane of the duct can be approximated to that of the stomach or intestine without tension, is evidently the operation of choice. Duct reconstruction by the Wilms' method has usually not given encouraging results. Implantation of biliary fistulas into the stomach or duodenum appears preferable. Either one or the other of these 2 procedures or anastomosis of the duct to the jejunum must be attempted when the greater part of the hepatic and common ducts is obliterated.

Treatment of strictures of the hepatic duct within the liver still presents a most difficult problem. An attempt should be made to establish a

fistula with the dilated portion of the duct or with a segment of liver parenchyma, previously penetrated with the cautery, which subsequently may be transplanted into the stomach or duodenum.

SAMUEL KAHN, M.D.

Beckman, T. M. Contributions to the Diagnosis of Surgical Conditions of the Pancreas. (*Contributions au diagnostic des pancréatites chirurgicales*) *Acta chirurg. Scand.* 1936, 78 Supp. 44.

The most important clinical symptom in pancreatic disease is pain. From a study of the pain and its radiation the author has come to the conclusion that it probably does not originate from pressure on the coeliac ganglion, as was formerly believed, but is due to local irritation of the nervous elements within the gland itself. The various radiations of the pain are probably related to the site of the pathologic process within the gland. The pain does not occur preponderantly on the left side.

The general toxic signs as well as the symptoms referable to a disturbance of hepatic and renal function such as icterus, urobilinuria, an increase of the non-protein nitrogen, and hematuria, are not of any great diagnostic importance, but are significant with regard to the prognosis. The resistance of the red blood cells in the various pancreatic disease groups is of no great aid in the diagnosis or the determination of the prognosis.

In chronic pancreatitis and in pancreopathy, palpation of the pancreas in the opened abdomen is of great diagnostic value. This is to be preferred to biopsy because of the danger of necrosis and the formation of fistulas.

From the anatomicopathological point of view the author believes that the old classification of pancreatic disease into acute necrosis, acute pancreatitis, and chronic interstitial pancreatitis does not conform to clinical observations. He has accepted the classification of Zoepffel, Schmieden, and Walzel who subdivide acute pancreatic necroses into edemas and pancreatic necroses. The term "pancreopathy" coined by Katsch and von Bergmann includes all mild and reversible forms of pancreatitis.

Trauma, especially surgical trauma, often gives rise to pancreatic lesions. Other etiologic factors are biliary stones, infections of the biliary passages, and duodenal ulcers.

The pathogenesis of pancreatic disease has been the subject of much controversy. The author favors the neurovascular theory advanced by Knape-Ricker. Although this theory is not entirely satisfactory, Beckman has used it as the basic hypothesis of his study. He calls attention to the fact that as the gland undergoes continuous changes any irritation is capable of producing a large number of different morbid conditions.

Of great diagnostic importance in pancreatic disease are functional tests. The demonstration of specific pancreatic ferments in the serum and urine constitutes a very important aid in the diagnosis.

of surgical conditions of the pancreas. The most important diagnostic method from the surgical point of view is the determination of diastase. It should be remembered however that an elevated diastase value throws no light on the nature of the pathologic process in the pancreas and that a normal diastase value does not definitely exclude the presence of a pathologic process in the pancreas. The normal diastase value in the serum as determined by Ottenstein's method ranges from 100 to 300 mgm. per cent and averages 170 mgm. per cent. The author has studied also the variations in the serum diastase following the administration of glucose.

In determinations of the atoxyl resistant lipases in 214 normal cases Beckman found that this fraction may increase in the serum in conditions such as advanced cachexia, pernicious anemia, endocrine disturbances and thyrotoxicosis. Abnormal lipase levels are found also in certain chronic arthropathies but aside from these exceptions atoxyl resistant lipase may be regarded as specific for the pancreas.

There is no parallelism between this latter reaction and the serum-diastase reaction. In acute pancreatic necrosis diastase is already demonstrable from six to eight hours after the onset and disappears within two or three days whereas the lipase level usually increases after two or three days.

The author demonstrates the reliability of these tests by statistical data. In applying the tests to a series of patients with surgical conditions in the attempt to discover the presence of pancreopathies he found that these conditions are relatively rare in cases of gastric and duodenal ulcer whereas surgical procedures for ulcers are often followed by pancreatic reactions. The reverse seems to be true in disturbances of the biliary tract. Prior to the operation especially in chronic conditions the incidence of pancreopathies is high whereas following cholecystectomy the pancreatic disturbances disappear.

In carcinoma of the pancreas the values of diastase and lipase rise above normal in about half the cases.

RICHARD E. SOMMA, M.D.

Riesman D. Kolmer J. A. and Fofowe D. Splenectomy in the Treatment of Subacute Bacterial Endocarditis. *Am J M Sc* 1936 192 45

The authors report in detail 4 cases of blood stream infection treated by splenectomy and review the literature on splenectomy in septic conditions

particularly subacute bacterial endocarditis. It has been suggested that in these conditions the spleen may act as a focus for the multiplication of bacteria and the formation of toxins. In the majority of cases the spleen is enlarged and the site of multiple infarctions. Because of these possibilities and facts the authors propose splenectomy for the treatment of subacute bacterial endocarditis.

In the first case they report that of a man fifty-seven years of age the symptoms and physical findings led to a diagnosis of subacute bacterial endocarditis. The patient showed marked improvement following splenectomy but died four weeks later from an abscess of the larynx.

The second case was that of a woman twenty-five years of age with a positive blood culture of gram positive non hemolytic streptococcus and enlargement of the spleen. As intensive treatment resulted in no improvement the enlarged spleen was removed. The operation was followed by immediate relief of the joint and abdominal pains and improvement in the red-cell count and hemoglobin. However the fever and showering of emboli continued and the patient died within a few weeks probably of a cerebral embolus.

The third case was that of a boy twenty-two years of age with a clinical picture typical of subacute bacterial endocarditis. Blood cultures were positive for streptococcus viridans. An enlarged spleen with many infarcts was removed. The operation was followed by immediate general improvement for ten days but the clinical symptoms then recurred and the patient died two months later.

In the fourth case that of a man thirty-nine years of age a probable diagnosis of mural subacute bacterial endocarditis was made. Following failure of all the usual methods of treatment splenectomy was performed as a last resort. Bacteriological examination of the spleen showed a pure culture of streptococcus viridans. The postoperative course was somewhat stormy. Since his discharge from the hospital the patient has gained 60 lb. and has been well for five months.

The authors conclude that splenectomy may prove to be a method of treatment in the intractable form of sepsis without a discoverable focus in which splenomegaly is a prominent feature. It promises the best results in cases in which acute bacterial endocarditis is suspected but unproved.

ROBERT ZOLLNER, M.D.

# GYNECOLOGY

## UTERUS

Arneson, A. N. The Distribution of Radiation Within the Average Female Pelvis for Different Methods of Applying Radium to the Cervix. *Radiology*, 1930, 27, 1

In a previous article the author published diagrams showing the distribution in the average female pelvis of roentgen irradiation given by a variety of methods. For the treatment of cancer of the cervix an arrangement employing 6 fields was found to be most satisfactory when irradiation was delivered with 200 kv, filtration by 0.5 mm Cu and 2.0 mm Al and a target-skin distance of 70 cm. In this arrangement 2 fields were used on the anterior surface, 2 on the posterior and 1 on each lateral aspect of the pelvis. Each field measured 10 cm transversely and 15 cm longitudinally. On the anterior and posterior surfaces the beam was always directed straight toward the underlying parametrium in order to protect the bladder and rectum.

In this article Arneson discusses radium irradiation and presents diagrams showing its distribution in various conditions in which radium is used alone or in association with roentgen irradiation. He states that in cancer of the cervix, radium applied to the cervix will control the disease in the primary focus and external roentgen irradiation will help to treat parametrial and outlying tumor-bearing regions more adequately. In order to be able to express both types of irradiation in the same unit, the threshold erythema dose is employed. This is defined as the amount of irradiation which, given at a single exposure, produces a visible reddening or bronzing of the skin within 4 weeks in 80 per cent of cases. In the case of the roentgen rays it is 525 r (measured in air) with 200 kv, filtration by 0.5 mm Cu and a field measuring 10 by 10 cm. In the case of radium it is approximately 225 mgm hr given with a tube 2 cm long at a distance of 1 cm. If other qualities or sources are used the values appear different.

The diagrams for radium irradiation show the distribution from an intra uterine tandem source consisting of 2 capsules with doses of 3,000 and 5,000 mgm hr, from an intra uterine tandem source (3,000 mgm hr) in conjunction with needles (1,500 mgm hr) inserted into the cervix, from an intra uterine tandem source (3,000 mgm hr) in conjunction with a radon bomb (1,500 mgm hr) or a radium plaque (1,500 mgm hr) placed against the cervix and from an intra uterine tandem source (3,000 mgm hr) in conjunction with a source of radium of 1,000 mgm hr located by means of a colpostat in each lateral vaginal fornix (total 2,000 mgm hr).

These for combined roentgen and radium irradiation show the distribution in the horizontal, transverse, and median sagittal planes in the treatment of cancer of the cervix through 6 fields by roentgen irradiation and by the application of an intra-uterine tandem and intravaginal colpostat for the radium irradiation. From the diagrams it is possible to estimate the irradiation distribution at various points, between which there are differences of several threshold erythemas. While no one plan is suitable for the treatment of all cases, the author recommends that this procedure be followed in the treatment of cancer of the uterine cervix whenever possible. He believes that further advance will

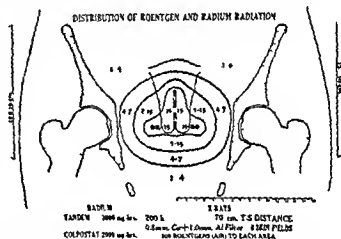


Fig 1 The distribution of roentgen and radium irradiation in the average female pelvis in the methods and with the doses specified

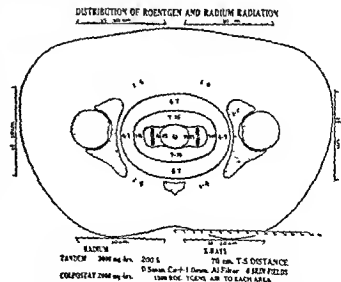


Fig 2 The distribution of roentgen and radium irradiation in a transverse section of the average female pelvis



## DISTRIBUTION OF ROENTGEN AND RADIUM RADIATION

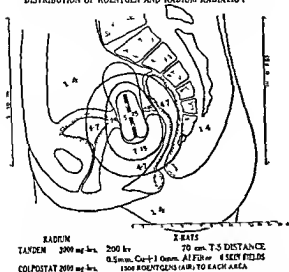


Fig 3 The distribution of roentgen and radium irradiation in a median sagittal section of the average female pelvis

probably be made by improving the method of external roentgen irradiation but little may be expected from changing the technique of radium application to the primary lesion

T. LEUCUTIA, M.D.

#### Hausding, H. Irradiated Cervical Carcinoma. A Critical Consideration of the Determination of the Prognosis (Die Epikrise des bestrahlten Colomcarcinoms. Eine kritische Betrachtung zur Prognosestellung). Strahlentherapie 1936 55 387

After reviewing the literature dealing with the problem under consideration the author first describes the method used in studies of 240 cancers of the uterine cervix which were treated in the period from 1923 to 1928. The specimens of tumor tissue were removed by excision, excochleation or the use of the cold cautery snare. In order to obtain entirely unaltered tissue for histologic examination they were always removed before the irradiation was begun. The staining was done by the usual hematoxylin-eosin method. In order that subjective error in judging the degree of differentiation might be reduced to the minimum serial sections were studied and the diagnosis was based upon the predominant findings. In addition repeated examinations of the specimen were made in order to reach the most certain and objective decision. In each specimen 25 fields were examined.

The author first attempts to answer the question whether it is possible to determine the prognosis from the degree of differentiation and the number of mitoses shown by an excised specimen of carcinoma.

Of the total number of 240 cases of squamous cell carcinoma of the uterine cervix 55 (22.9 per cent) were of the well differentiated type, 101 (42.1 per

cent) of the moderately differentiated type and 84 (35 per cent) of the undifferentiated type. These figures correspond approximately to those of statistics collected from the literature. The author states that in judging the degree of differentiation certain subjective factors can never be eliminated entirely.

The relations between the degree of differentiation and the number of mitoses were determined. In this connection progressive atypicity of the tissue and the increase in karyokinetic figures may be regarded as evidence of malignancy and rapid proliferation. Moreover the number of mitoses is greater the less the differentiation of the cancer. The percentage of cancers of the undifferentiated type which showed more than 100 mitoses in the 25 fields examined was 7 times greater than that of cancers of the well differentiated type. These relations are shown clearly by a curve.

The degree of differentiation and the prognosis of the cases are compared. Of the 240 cases permanent cure was obtained in 32 (13.3 per cent). Among the latter there were twice as many cases of undifferentiated carcinoma as cases of well differentiated carcinoma. On the other hand of 99 carcinomas which were fatal a somewhat greater number were of the undifferentiated than of the well differentiated type.

To answer the question of the significance of numerous mitoses the author considers the sensitivity to irradiation not only of the cancers which were cured for five years but also of those which were fatal in the first year after treatment. The problem is the relationship between the number of mitoses and the prognosis. Nearly 3 times as many cancers with few mitoses as cancers with numerous mitoses terminated fatally within the first year after treatment. Cancers with numerous mitoses were more sensitive to irradiation.

Finally the author discusses the principal question—the possibility of determining the prognosis from the degree of differentiation and the number of mitoses. His findings show that in the more atypical forms of cancer the incidence of five year cure was twice as high in cancers with numerous mitoses as in cancers of the well differentiated type. On the other hand among those of the differentiated type there were twice as many with few mitoses as among those of the more atypical type. The absolute numbers of all 3 degrees of differentiation showed with progressive atypicity of increasing irregularity of their histologic structure a proportionate increase in the number of mitoses. This observation suggests the possibility that in atypical forms with an increasing number of mitoses (which is considered not an absolute but an important criterion of greater rapidity of growth) the incidence of five year cure is higher than in the fully differentiated forms with numerous mitoses. However, a constant relationship between the degree of differentiation and the number of mitoses could not be determined.

Quite a number of the reviewed cases could not be placed in any classification from which definite con-

clusions could be drawn. The author cites 3 characteristic cancers with histologic pictures showing the danger of overevaluating irradiation.

In conclusion he says that, for practical purposes, establishment of the prognosis of irradiated cervical cancer on the basis of the microscopic findings alone has only conditional validity.

(G. SCHAEFER) DANIEL G. MORTON, M.D.

# Scheffey, L. C. Carcinoma of the Cervical Stump *J. Am. Med. Ass.*, 1936, 707, 837

The reported incidence of carcinoma of the cervical stump varies considerably. The variation is due to unreported cases, diagnostic errors, and different conceptions as to what constitutes the condition. In 4,269 cases of carcinoma of the cervix collected from the literature, von Graff found that the incidence of carcinoma of the cervical stump reported for the different groups ranged from 2.5 to 11.3 per cent, and that in the total number of cases the average incidence was 4.1 per cent. Richardson believes that the incidence does not exceed 3 per cent. In 1,022 cases of cervical carcinoma reviewed by Kretschmar and Gardiner it was 1.76 per cent. Of 273 cases of carcinoma of the cervix admitted to the Jefferson Medical College Hospital, Philadelphia, in the period from September 1, 1921 to September 1, 1935, 10 (3.66 per cent) were cases of carcinoma of the cervical stump.

The frequency with which carcinoma develops in the cervical stump can be determined only with relative accuracy as the follow up of consecutive cases of supravaginal hysterectomy is difficult. In 7,244 cases collected from the literature by von Graff it was 0.62 per cent. In approximately 10,000 subtotal hysterectomies reported by a dozen surgeons, Richardson found it to be a little less than 1 per cent. Fahrni reported that in almost 20,000 cases which he collected from the literature it was a little less than 0.04 per cent.

Scheffey was able to follow up 554 patients who were subjected to supravaginal hysterectomy. Of these, 5 (0.902 per cent) developed carcinoma of the cervical stump. He admits the inadequacy of the follow up in many of the cases.

He analyzes 10 cases of carcinoma of the stump with reference to whether the carcinoma was present at the time of the operation or developed later. He states that this decision cannot be based entirely on the time elapsing between the operation and the discovery of the cancer. The presence of cancer can be proved only by biopsy or amputation. In 3 of the 10 cases the carcinoma probably existed at the time of the operation, and in 2 it may possibly have been present at that time. In the 5 others it appeared from six to twenty one years after the operation and therefore probably developed postoperatively. Failure of recognition in the first 5 cases might have been avoided by more careful study.

Healy and Arneson have emphasized the hazards of both surgery and radium in the treatment of carcinoma of the stump of the cervix. By a careful

irradiation technique they obtained a five year cure in 14 per cent of cases. In a series of cases collected by von Graff, the incidence of five year cure was 9.3 per cent. Meigs reported a 7.6 per cent incidence of cure. Recently Sackett reported statistics from the George Gray Ward Clinic showing that the incidence of five year survival was 48.4 per cent.

In the 10 cases reviewed by Scheffey the incidence of five-year cure was 42.8 per cent. Four cases were treated with radium alone. A short bomb was placed in the canal and radium needles were employed around the periphery. In 5 cases this treatment was combined with high voltage x-ray irradiation. In 1 case, only x-ray irradiation was used. The author emphasizes the importance of protecting the normal surrounding tissue by liberal packing.

In discussing the measures which should be taken to prevent the development of carcinoma of the cervical stump, Scheffey states that the association of fibromyomas with cancer of the cervix has been noted for a long time. Cervical carcinoma has been associated also with damage and disease of the cervix. Most hysterectomies for non malignant conditions of the uterus are for fibromyomas or are performed in cases in which the cervix is diseased. Therefore it would seem that the performance of panhysterectomy in all such cases would be a proper measure for the prevention of cancer of the cervical stump. Scheffey believes that the incidence of cancer of the stump is comparatively less than the greater mortality and morbidity resulting from complete hysterectomy as compared with supravaginal hysterectomy when these operations are performed by the average surgeon. Siddall and Mack found that in a collected series of 4,550 cases in which the complete operation was performed the mortality was 3 per cent, and in 7,795 cases in which the subtotal operation was done it was 2.6 per cent. In their own cases, the mortality of total hysterectomy was 6.4 per cent, and that of supravaginal hysterectomy, 2.6 per cent. Richardson agrees that panhysterectomy is usually more dangerous than supravaginal hysterectomy.

Scheffey therefore believes that the performance of panhysterectomy as a routine procedure is not rational even in the presence of disease of the cervix. In lieu of routine panhysterectomy he recommends thorough preliminary examination of the cervix with biopsy, and with cauterization or cervical resection if necessary. He believes that such a careful examination should be made even when the pelvic pathologic condition is apparently well defined. For some cases presenting no insurmountable technical difficulties he recommends the complete operation. Of the 554 patients he followed up after supravaginal hysterectomy, 170 received treatment of the cervix prior to the operation. Of the latter, cancer of the stump is known to have developed in only 1 (0.508 per cent). Of the 384 patients who were not given such pre operative treatment, cancer of the stump developed in 4 (1.04 per cent).

DANIEL G. MORTON, M.D.

## ADNEAL AND PERIUTERINE CONDITIONS

Frankl O Hydrosalpinx (Zur Hydrosalpinfrage)  
*Ztschr f Geburtsh u Gynaek*, 1936 113 1

In hydrosalpinx there are adhesions of folds and pseudofollicles are formed even without a preceding pyosalpinx. The epithelium may become flattened by pressure. Not rarely, unusually wide and numerous blood vessels are seen in the folds. Inflammatory infiltration may be present not only in the early stages, but may persist for quite a long time. On the other hand, it may be entirely absent in the early stages. The author does not agree with the opinion that the hydrosalpinx fluid is merely retained normal secretion of the tube. He states that it must be either a transudate or an exudate. A low specific gravity, a decreased albumin content and the absence of inflammatory infiltration indicate transudation, while a high specific gravity, an increased albumin content and the presence of inflammatory infiltration indicate exudation. A low specific gravity and a decreased albumin content in the presence of inflammatory infiltration indicate either the absence of exudation or dilution of an exudate by a transudate. A high specific gravity and an increased albumin content in the absence of inflammatory infiltration indicate a serous inflammation of the type described by Eppinger and his co workers. An inflammatory origin of hydrosalpinx is suggested by the relatively frequent association of the condition with salpingitis isthmica nodosa.

It is impossible to differentiate an inflammatory early stage and a late transudative stage, but an active and a passive phase may be recognized. In the active stage the accumulation of fluid occurs with gradual distention of the tube while in the passive stage there is no further accumulation of fluid. Circulatory disturbances with transudation are of the greatest importance in the development of hydrosalpinx but endosalpingitis as a serous inflammation is another important factor which may not be limited to the primary stage of the process. The author does not believe that pyosalpinx develops directly into hydrosalpinx. For the term 'hydrosalpinx' to which Aschoff objected, he suggests substituting the term 'salpingitis serosa'.

(FRANKL) LEO A JUCKE MD

Solomons B The Conservative Treatment of  
 Pathological Conditions of the Fallopian Tube  
*J Obst & Gynec Brit Emp* 1936 43 619

The author is of the opinion that conservative treatment of the fallopian tubes is to be considered only when salpingitis is believed to be the chief etiological factor in the given condition. He classifies salpingitis into acute and chronic types. He states that in acute salpingitis palliative treatment is the treatment of choice.

In a study of the fallopian tubes by the injection of iodized oil the tubes appear somewhat larger because they are dilated by the oil. As a rule they leave the uterus in a straight line. Anesthesia interferes with the peristalsis of the tubes. A definite relationship between rhythmical contraction of the fallopian tubes and the menstrual cycle seems to have been demonstrated. In Solomons' opinion, some of the cures of sterility from the injection of powerful hormones may be accounted for by this relationship through an indirect action on the tubes. During the passage of the ova the fimbriated ends of the fallopian tubes remain passive. This fact may explain cures of sterility after removal of the fimbriated ends.

That the use of lipiodol is not harmless is shown by records in the literature of the occurrence of death in 5 and of infection in 13 of 2,000 cases in which lipiodol insufflation of the tubes was done.

The author agrees with others that insufflation of the fallopian tubes with air or their injection with an opaque material often results in cure of sterility.

To determine the attitude of gynecologists toward operation on the fallopian tubes Solomons sent out 150 questionnaires. According to the replies most gynecologists do not open the abdomen primarily for operation on the tubes but if they perform a laparotomy for some other reason and find the tubes diseased they resect the ends of the tubes and separate adhesions. Some of them reported that they never operate upon the tubes, some that they operate only on the fimbriated ends and some that they operate on all portions of the tubes. The incidence of successful results from operations on the fallopian tubes as determined by the subsequent occurrence of pregnancy was reported at about 20 per cent.

HERBERT F. THURSTON MD

# OBSTETRICS

## PREGNANCY AND ITS COMPLICATIONS

Wójcicki, H. The Sequelæ of Extra-Uterine Pregnancy (Folgen der Extrauterinschwangerschaft) *Ginek polska*, 1936, 15 29

The author reviews 426 cases of extra uterine pregnancy which were admitted to the Gynecological Clinic of the University of Warsaw in the period from 1921 to April 30, 1935. In 420 of these cases laparotomy was performed. The total number of deaths was 21, a mortality of 4.9 per cent. In 83 per cent of the cases the chief factor favoring the development of extra uterine pregnancy was salpingitis from which the patient had recovered or which was still present. This was demonstrated by microscopic examination of the specimens removed in 206 cases. In 6 (3.5 per cent) of the cases tuberculosis of the tubes was found, and in 2, a malignant chorionepithelioma. In 35, no evidence of inflammation was noted. Of 3 women with simultaneous extra uterine and intra uterine pregnancy, 1 aborted immediately after laparotomy, 1 aborted at home several weeks after operation, and 1 had a normal delivery.

Experience shows that in cases in which extra uterine pregnancy is suspected, curettage may interrupt the pregnancy. Therefore it should be done only in a hospital where an immediate laparotomy may be performed if necessary. In only exceptional cases will the curetted specimen present proof of the presence of an extra uterine pregnancy (decidua without chorionic villi). More frequently, the microscopic picture shows the changes of the menstrual cycle. The Asebbheim Zondek test is of value in the diagnosis of extra uterine pregnancy only when it is positive. At operation, the possibility of a subsequent pregnancy should always be kept in mind. Therefore the procedure should be as conservative as possible. Under favorable conditions salpingostomy may be done.

According to the replies to a questionnaire, the incidence of recurrence of extra uterine pregnancy in the cases reviewed was 3.2 per cent and the incidence of subsequent normal pregnancy 36.8 per cent. Therefore the theory that to prevent recurrence of extra uterine pregnancy it is necessary to remove the non pregnant tube as well as the pregnant tube even if the former is macroscopically normal is not justified.

In follow up examinations of 32 women whose cases are reviewed it was found that the incidence of adnexal tumors and indurations was higher after the less radical operations and that the incidence of pain was higher after the more radical operations (adnexectomy, salpingectomy, supravaginal amputation of the uterus).

(BECK) JOHN W. BRENNAN, M.D.

Berkeley, Sir C. Unavoidable Hemorrhage. *J. Obst. & Gynec. Brit. Emp.*, 1936, 43 393

This article is based on 5,107 cases of placenta prævia occurring in 500,988 obstetrical cases. A critical study was made of only 4,580 as in the records of 537 certain details essential for such a study were omitted.

Some authorities criticize adversely the presentation of massed statistics, especially from foreign sources, maintaining that, since most readers do not know the authors personally, their standing or their technique, they are unable to interpret such figures correctly. However, so far as the majority of British readers are concerned, this criticism is not applicable to the statistics presented in this article as they are based on the practice of professors of obstetrics in maternity hospitals and chiefs of the maternity departments of general hospitals in England, Wales, Scotland, Northern Ireland, and the Irish Free State. Most of the reports cover the period of the last 5 years, but 4 cover a longer period.

The reason why the zygote, or part of it, becomes implanted on the lower segment of the uterus is unknown. The few theories advanced have been found on critical examination to be unsatisfactory. The suggestion that subinvolution and chronic endometritis may be the principal factors is based on the belief of many that placenta prævia is far more common in multiparas than in primigravidas. In general, this belief is correct, but if some women who have borne 1, 2, or more children are considered, placenta prævia is far more frequent in primigravidas.

According to five year periods, the greatest number of the women whose cases are reviewed were between thirty one and thirty five years of age and the next greatest number (only 33 fewer) were between twenty six and thirty. The condition occurred most often in women thirty two years of age and next most often in those thirty years of age.

Of 4,406 women, 886 (20.1 per cent) were primigravidas and 3,520 (79.9 per cent) multiparas.

Of 4,065 women, 2,808 (69.0 per cent) had been pregnant for 36 weeks or longer and 1,257 (30.9 per cent) for less than 36 weeks. The placenta prævia was diagnosed most often at term and next most often in the thirty sixth week of pregnancy. As a rule the diagnosis is quite easy.

Cases of placenta prævia may be divided into 2 groups: (1) those in which the cervical canal is sufficiently patent to allow a finger to be passed through it, and (2) those in which the external os is closed so that a finger cannot be passed through it. In cases of the second group, in which the placenta is far more often of the complete variety, the slight expansion of the lower uterine segment is sufficient

to cause slight separation of the placenta but not sufficient to cause dilatation of the internal os permitting the passage of a finger. Therefore the diagnosis must remain uncertain for a time. Although there are certain signs suggesting the nature of the condition they are by no means absolute.

A certain amount of confusion has been caused by the description of the different varieties of placenta prævia by such adjectives as 'central', 'complete', 'incomplete', 'marginal', 'partial', 'lateral' and 'high lateral'. It has been caused also by rare cases in which bleeding occurs when the cervix is closed and rigid. Bleeding usually signifies dilatation of the lower uterine segment and cervical canal and under such conditions the placenta can be felt. In most of the rare cases mentioned the placenta is central and the smallest amount of dilatation is able to separate it.

The author gives the following rules for treatment of placenta prævia.

1. Control the bleeding as soon as possible. The patient will never be safe until the child is delivered and the uterus is well retracted. There have been many maternal deaths from antepartum hemorrhage in cases without bleeding after delivery of the child and placenta. The method of choice to control the bleeding depends upon the variety of the placenta prævia. Packing of the vagina though a poor method is indicated when (a) dangerous bleeding occurs before the patient can be removed to a hospital, (b) the condition of the patient is so serious that active treatment should not be employed until she has had a blood transfusion or an infusion of salt solution and glucose, (c) sudden severe bleeding follows a vaginal examination and the physician is unprepared to employ one of the methods of delivery at once. As a rule the packing is done very inefficiently doubtless because of a lack of adequate illumination, proper material and instruments and expert assistance. When it must be done because of dangerous bleeding or the distance of the patient's home from a hospital the packing should be soaked in an antiseptic.

The importance of controlling the bleeding as soon as possible is evident from the mortality of postpartum hemorrhage. In cases of placenta prævia postpartum hemorrhage is much more serious than in cases in which the implantation of the placenta is normal because on account of the antepartum hemorrhage and the frequent deficient retraction of the uterus resulting therefrom the loss of only a few ounces of blood will be sufficient to cause death whereas when the implantation of the placenta is normal the loss of more than a pint is usually necessary for a fatal termination. Unless the patient is bleeding dangerously the delivery of the placenta should not be hurried. The separation should be allowed to occur naturally and in the meantime measures should be taken to improve the patient's condition. Removal of the placenta manually because it has not separated in the usual time is fraught with great danger of infection and

shock. It must be borne in mind that in cases of placenta prævia the lower uterine segment is friable and therefore easily torn during manipulations to deliver the child. There are reports of cases in which such an injury resulted in death from postpartum hemorrhage. If abnormal bleeding occurs after the third stage of labor the cervix should be examined at once. In the reviewed cases postpartum hemorrhage with shock was the second most common cause of death, being responsible for a mortality of 18.0 per cent. In 22.4 per cent of the cases of death due to this cause the condition of the patient at the time of her admission to the hospital was recorded as good.

2. Do not make a vaginal examination unless you are prepared to give appropriate treatment at once. A vaginal examination may easily separate an additional area of placenta or disturb blood clots, thereby increasing the bleeding to a serious degree before the patient can be sent to a hospital or expert assistance can be obtained. When the pregnancy is so far advanced that placenta prævia is suggested as the cause of bleeding the patient should be taken to a hospital or a nursing home before a vaginal examination is made.

3. Combat shock if it is present. In the cases reviewed shock was responsible for a mortality of 18.0 per cent although in 34.5 per cent of the cases with fatal shock the condition of the patient at the time of her admission to the hospital was recorded as good. If the hemorrhage has been controlled severe shock and collapse are indications for delay of operative interference until some degree of recovery has been brought about by the treatment. If the hemoglobin which can be easily and quickly estimated in the ward is below 30 per cent immediate blood transfusion is indicated. As both fluid and red cells are needed, from 500 to 600 c cm of blood should be given. When the anemia is less severe the transfusion of from 250 to 300 c cm of blood or the alternate intravenous infusion of saline solution and glucose is sufficient. When there is shock with low blood pressure from 50 to 100 c cm of a 30 per cent hypertonic solution should be given. A systolic blood pressure below 100 mm is a danger signal and an indication that operative interference should be delayed if possible until treatment can be given. Drugs appear to be of little value. Of those recommended ephedrine, adrenalin and coramine are most likely to relieve circulatory failure. Bandaging of the limbs, hot drinks and the application of hot water bottles may also be beneficial. When a patient is suffering from shock at the time of her admission to the hospital the blood of the relatives who accompany her should be typed in case a blood transfusion is considered desirable then or should become desirable later. If any noteworthy bleeding occurs during the delay of operative treatment the vagina should be packed, every care being taken to prevent septic infection.

4. Take every precaution to prevent septic infection. Septic infection is the most common cause

of death in placenta prævia. Because of the proximity of the placental site to the vagina and the necessity of touching it in many of the methods of delivery, and because of the inevitable bleeding which lowers the patient's resistance, this is not surprising. In the reviewed cases the mortality due to septic infection was 20.5 per cent. Nevertheless, in 63 per cent of the cases of death from that cause the condition of the patient at the time of her admission to the hospital was recorded as good. In the cases in which the vagina was packed, the mortality from sepsis was 23.5 per cent, and in those in which the placenta was removed manually it was 18.4 per cent.

5 Do not hasten delivery except in cases in which cesarean section is done. In some cases it may be advisable to delay even cesarean section until the patient's condition has improved. In 14.6 per cent of the reviewed cases in which this operation was followed by death the patient was admitted to the hospital in a state of collapse. Hastening delivery favors shock, postpartum hemorrhage, and tears of the cervix and lower uterine segment, and increases the risk of sepsis and the risk to the child. So long as there is no dangerous bleeding the labor should be allowed to progress normally. In the meanwhile measures should be taken to improve the patient's condition. When labor is slow, the open vessels in the placental site are given a better opportunity to become thrombosed and the uterus a better opportunity to regain or increase its retractile power. The lower segment of the uterus is especially liable to injury in cases of placenta prævia. Exceptions to Herman's aphorism "slow extraction and antisepsis are cases in which, a bag having been inserted and later expelled, the release of pressure on the placental site results in the onset of dangerous bleeding."

6 Perforate the placenta, if its perforation is necessary, with a sharp pointed instrument. The best treatment of a patient whose os is completely covered with placenta appears to be quite obvious except when her surroundings and the lack of expert assistance contra indicate cesarean section. As a rule perforation of the placenta will not be necessary, but when it is required a sharp pointed instrument should be used as otherwise the placenta may be further separated and furious hemorrhage may result.

7 Whenever possible treat the patient in a hospital or a nursing home as it is never known when her condition may suddenly become worse. In such surroundings the danger of infection is decreased and all the appliances that may be required are at hand.

J THORNWELL WINTERBROOK, M.D.

Henry, J. S. The Effect of Pregnancy upon the Blood Pressure. *J. Obst. & Gynec. Brit. Emp.*, 1936, 43, 903.

After reviewing the principal publications of the last thirty five years on the effect of pregnancy upon the blood pressure, the author reports a study of the

blood pressure of 618 women with apparently normal pregnancies and 284 women suffering from various toxemias of pregnancy. From his findings he draws the following conclusions:

1 There is no rise in the systolic or diastolic blood pressure during normal pregnancy.

2 There is a marked fall in the diastolic pressure and a rise in the pulse pressure in normal pregnancy, and some evidence for the belief that the systolic pressure is lower than in the non pregnant state.

3 The toxemias of pregnancy, pre eclampsia, and eclampsia do not appear suddenly in the last few weeks of pregnancy. On the contrary, they give warning of their development for days, weeks, or even months by an elevation and irregularity in the blood pressure. Frequently these changes are recognizable in the first trimester. In the later and more severe course of the toxemias a disproportionately high diastolic pressure and an abnormally low pulse pressure appear to be definitely proved.

4 Any rise in the blood pressure during pregnancy is of pathologic origin and is evidence of some degree of toxemia.

5 In normal pregnancy the decrease in the blood pressure and the increase in the pulse pressure, together with a probable decrease in the viscosity of the blood, constitute a mechanism by which the heart is enabled to meet the increased demands made upon it by the increase in the blood volume and vascular area without going beyond the limits of its reserve.

STANLEY C. HALL, M.D.

## LABOR AND ITS COMPLICATIONS

Wrigley, A. J., Roques, F., Walker, A., Spencer, H., and Others. On the Motion "That Induction of Premature Labor Should Not Play Any Part in the Treatment of Pelvic Contraction or Disproportion in Primigravida." *Proc. Roy. Soc. Med.*, London, 1936, 29, 1473.

WRIGLEY stated that in his opinion the surgical induction of premature labor in the cases of primigravida is unjustifiable because (1) it is impossible to estimate the fit of the fetal head into the pelvis, (2) the procedure has resulted in an increase in fetal and maternal mortality and in maternal morbidity, (3) induced labor is frequently complicated by imperfect uterine action with its accompanying dangers, (4) surgical means may fail to induce labor, thereby causing more dangerous complications, and (5) he has obtained better results by other means.

ROQUES said that he favored an expectant attitude because no obstetrician can foretell with any degree of accuracy before labor has begun how it will progress since the mode of action of the factors concerned in engagement or non engagement of the head is variable.

WALKER discussed trial labor. He said that he regarded it, not as a battle between the fetal skull and the bony pelvis, in which it is hoped the skull will collapse before the uterus gives out, but as the provision of an opportunity for a deflexed head or a

conical lower uterine segment to re adjust itself and for the increasing tension on the cardinal ligaments to pull down the uterus and its contents. When time has been given for this re adjustment to take place, the position can be reviewed afresh.

SPENCER said that induction of labor in cases of minor contraction or disproportion and cesarean section in cases of more marked contraction and disproportion reduce the frequency of forceps delivery with its well known dangers to mother and child render craniotomy on the living child unnecessary except when there is hydrocephalus and have a low total maternal and fetal death rate. Induction is safer for the mother than the use of forceps or cesarean section. Although the associated infant mortality is about 12 per cent, infants born after the thirty fifth week of pregnancy counting from the last day of the last period grow up into strong and healthy men and women.

WYATT stated that there are 2 variable factors in all labors (1) the strength and frequency of the pains and (2) the size of the fetus. If the pains are weak the first stage will be prolonged and the patient will be so tired that when her voluntary efforts which are so valuable in the second stage are needed they will not be sufficient to help mould the head through the pelvis. The size of the fetus,

whose weight at full term may be as high as 10 lb may make normal delivery through a small pelvis impossible. If it were possible to limit the weight of the infant at birth to 7 lb maternal morbidity and mortality would be considerably decreased.

WILLIAMS stated that the use of the x rays in obstetrics has shown that fetal deflexion is physiological until the forces of labor set in to promote flexion. Exclusive of the pelvis of the Goldthwait asthenic physical type tickets certain other bone diseases and the large post mature over ossified fetal skull disproportion at the brim is the rarest cause of the floating head contrary to statements frequently made in standard textbooks.

LUSK said that the induction of premature labor in cases of contracted pelvis or disproportion in primigravidae originated in Britain and has been practised by British obstetricians ever since. The general indications are slight or moderate degrees of pelvic contraction in which the true conjugate is estimated at not less than 3½ in. The fetus should be not more than 4 weeks premature. In the period from the thirty sixth week to full term the strength of the child increases but as the head also becomes harder, induction must not be too long delayed. The correct time for it can be estimated with considerable accuracy if the patient is examined at frequent intervals toward the end of pregnancy. The examination should include measurement of the umbilical girth and the height of the fundus uteri, and thorough palpation to determine the size of the fetus. When it is found that the fetal head cannot quite be pushed into the brim of the pelvis by abdominal manipulation, an examination should be made by the bimanual method, if necessary under

anesthesia. The level of the most advanced part of the fetal head with reference to the lower margin of the symphysis pubis will supply information of value. The character of labor following induction by bougies is not different from that of an ordinary labor. Because of the softness of the fetal head the use of forceps should be avoided if possible and as the fetus will not be so strong as a full time child prolonged or deep chloroform anesthesia is contra indicated. In the cases of women of the middle and upper classes, the economic factor must be taken into consideration. These classes are limiting their families because of the cost of confinement and the rearing of children. They find it difficult to pay for the advantages of nursing home treatment. If a test labor is to be carried out the woman must go to a nursing home and if delivery is effected by cesarean section, considerable extra expense is incurred and will be repeated at future confinements. Therefore it seems reasonable to assume that if test labors and cesarean sections are practised to the exclusion of the induction of premature labor the birth rate in the upper and middle classes will be reduced even lower than it is at the present time.

NORMAN said that he spoke on the basis of many years experience in maternity work as a general practitioner. In spite of the dangers and the terrors which had been portrayed as associated with the induction of labor he still favors the procedure. Its merits must be judged from its results as compared with those of cesarean section. During his experience of 30 years Norman had had several cases in which cesarean section prevented the woman from having more children. He regards the induction of labor as perfectly safe. He has carried it out both in private practice and in institutions and had had no poor results. In no case did pyrexia develop.

THEOBALD stated that he believed it is possible to form a very accurate opinion as to whether the head can pass through the pelvis, and that the "pains" can be increased by the exhibition of such drugs as quinine, morphine, and scopolamine. He has given up trial labor because of the risk of sepsis although he believes that it may be of advantage in a small number of cases. In his opinion the most common cause for the head's remaining above the brim until after the onset of labor is increased inclination of the pelvic brim. This can be demonstrated and the course of labor prognosticated. In conclusion he stated that the proper time to take steps to avoid operative interference is at the beginning of the first stage of labor.

KERR said that it is impossible in the thirty sixth week of pregnancy to tell whether, in borderline cases, the head will pass through the passage or not. Neither is it possible to determine beforehand even by roentgenographic pelvimetry and cephalometry how the head is going to mould in labor or to foretell the strength of the uterine contractions. These very important uncertainties arise in all cases. It is only when labor is in progress that it is possible to prognosticate with any degree of certainty whether the

head will pass through the pelvis or not. Obviously, therefore, in the cases of primigravidae the only possible course is to allow the patient to go into labor, estimate the disproportion, and then decide for trial labor or cesarean section.

FACE stated that he is convinced that induction of labor has a very definite, if limited, place in the delivery of women with minor degrees of contracted pelvis and disproportion. He bases his opinion on the following facts:

1 The maternal morbidity of induction of labor is only 0.1 per cent higher than that of trial labor.  
2 The fetal mortality is only 2.4 per cent higher than that of trial labor.

3 Trial labor is of no more value in deciding the conduct of labor in a second pregnancy than induction of labor. Every pregnancy must be regarded afresh from this standpoint, no matter how the first labor was ended.

4 The length of time required for recovery is much longer after abdominal delivery than after vaginal delivery, and the information gained from an abdominal delivery is of little value in the conduct of the next labor.

5 The fetal mortality of abdominal section following trial labor is so high that the decision to deliver abdominally must be made very early in labor and therefore cesarean section may be done in cases without absolute disproportion.

BOURNE reported that he had not induced labor on account of so called disproportion since the visit, in 1923, of Williams, who had said that he never did so. He stated that in this discussion too much stress had been laid on the weight of the baby. Induction of labor is carried out in order to obtain a smaller head. He had made measurements and had obtained measurements by others of a large number of babies' heads. Assuming the shape of the presenting head to be a sphere the average reduction in the presenting diameter obtained by induction in the thirty-sixth week is not more than  $\frac{1}{8}$  in. He therefore doubts whether it is worth while to induce labor for such a comparatively small reduction in size.

GUNN said that a cesarean section rate of less than 0.5 per cent does not suggest that it has been increased by refusing altogether to perform surgical induction for disproportion in primigravidae.

WINTERSTON reported that at the Middlesex Hospital during the last 10 years there have been 44 cases in which labor was induced because of disproportion in primigravidae. The method used was the insertion of a soft rubber bougie. The average length of the first stage of labor was 28 hours. The incidence of the use of forceps, which should be low on premature babies, was 18 per cent. In half of the cases in which forceps were used they were employed on account of signs of fetal distress. Sepsis occurred in 15 per cent of the cases and in half of these it followed forceps delivery. The still birth rate was 13 per cent, which is much too high. Half of the stillborn babies were delivered with forceps. Unfortunately there were very few postmortem

reports. In 13 per cent of the cases the woman was obliged to remain in the hospital longer than the usual time on account of difficulty in feeding the baby and failure of the child to gain weight.

McILROY advocated non interference with pregnancy in cases of pelvic contraction and disproportion. She stated that she had almost entirely given up induction in these cases, not because of poor results, but because if the woman is left alone, she gets along as well as, if not better than, she would without surgical interference. When once surgical induction had been carried out, the bolt has, so to speak, been shot, and further interference by forceps or cesarean section is fraught with the danger of injury or sepsis. This is one of her chief reasons for abandoning induction. She believes that too much stress had been laid upon the size of the bony pelvis and uterine forces. The pelvic ligaments must also be considered, as the progress of an easy labor depends to a certain extent upon the degree of elasticity of the ligaments which unite the pelvic bones. No estimate of these can be made from pelvic measurements. The mobility of the pubic arch can be estimated by examining the patient in the standing position with 2 fingers placed under the arch and the patient directed to raise first one foot and then the other. The movements of the pubic bones are a fair indication of the mobility of the joint and its power of expansion. McILROY stated that if surgical induction is to be abandoned, something else must be substituted for it. Pelvic joints and tissues can be softened to a considerable extent by daily hot sitz baths during the 2 or 3 weeks just preceding term, and rigidity of the birth canal reduced by the administration of 15 gr. of chloral hydrate every night for a week before labor is due.

GILLIATT said that no trial can be called a trial labor until the membranes have ruptured.

ALLEN cited a case which showed how impossible it is to estimate the fit of the head into the pelvis. He had recommended a patient from an antenatal clinic for cesarean section. His findings were checked by others, and it was agreed that the operation should be performed. On the way to the operating room the nurse said that the head was well in the pelvis. The woman was delivered without even the use of forceps.

ROQUES strongly condemned the practice of subjecting a patient to cesarean section after failure of an attempt to induce labor by surgical means. He cited Kerr's statement that this is the most dangerous procedure in obstetrics. In answer to Gilharr, he said that Walker's definition of trial of labor was incomplete. The trial cannot be said to have ended until after the membranes have ruptured.

J. THORNTON WITHERSPOON, M.D.

Hanson, S. The Transversely Contracted Mid-pelvis, with Particular Reference to Forceps Delivery. *Am J Obst & Gynec*, 1936, 32, 385.

The clinical significance of the transverse diameter of the narrow pelvic plane, as represented by the



conical lower uterine segment to re adjust itself and for the increasing tension on the cardinal ligaments to pull down the uterus and its contents. When time has been given for this re adjustment to take place the position can be reviewed afresh.

SPENCER said that induction of labor in cases of minor contraction or disproportion and cesarean section in cases of more marked contraction and disproportion reduce the frequency of forceps delivery with its well known dangers to mother and child, render craniotomy on the living child unnecessary except when there is hydrocephalus and have a low total maternal and fetal death rate. Induction is safer for the mother than the use of forceps or cesarean section. Although the associated infant mortality is about 12 per cent infants born after the thirty fifth week of pregnancy counting from the last day of the last period grow up into strong and healthy men and women.

WYATT stated that there are a variable factors in all labors (1) the strength and frequency of the pains and (2) the size of the fetus. If the pains are weak the first stage will be prolonged and the patient will be so tired that when her voluntary efforts which are so valuable in the second stage, are needed they will not be sufficient to help mould the head through the pelvis. The size of the fetus whose weight at full term may be as high as 10 lb may make normal delivery through a small pelvis impossible. If it were possible to limit the weight of the infant at birth to 7 lb maternal morbidity and mortality would be considerably decreased.

WILLIAMS stated that the use of the x rays in obstetrics has shown that fetal deflexion is physiological until the forces of labor set in to promote flexion. Exclusive of the pelvis of the Goldthwait asthenic physical type rickets certain other bone diseases and the large post mature over ossified fetal skull disproportion at the brim is the rarest cause of the floating head contrary to statements frequently made in standard textbooks.

LUKER said that the induction of premature labor in cases of contracted pelvis or disproportion in primigravidae originated in Britain and has been practised by British obstetricians ever since. The general indications are slight or moderate degrees of pelvic contraction in which the true conjugate is estimated at not less than  $3\frac{1}{4}$  in. The fetus should be not more than 4 weeks premature. In the period from the thirty sixth week to full term the strength of the child increases but as the head also becomes harder induction must not be too long delayed. The correct time for it can be estimated with considerable accuracy if the patient is examined at frequent intervals toward the end of pregnancy. The examination should include measurement of the umbilical girth and the height of the fundus uteri, and thorough palpation to determine the size of the fetus. When it is found that the fetal head cannot quite be pushed into the brim of the pelvis by abdominal manipulation an examination should be made by the bimanual method if necessary under

anesthesia. The level of the most advanced part of the fetal head with reference to the lower margin of the symphysis pubis will supply information of value. The character of labor following induction by bougies is not different from that of an ordinary labor. Because of the softness of the fetal head, the use of forceps should be avoided if possible and as the fetus will not be so strong as a full time child, prolonged or deep chloroform anesthesia is contra indicated. In the cases of women of the middle and upper classes, the economic factor must be taken into consideration. These classes are limiting their families because of the cost of confinement and the rearing of children. They find it difficult to pay for the advantages of nursing home treatment. If a test labor is to be carried out the woman must go to a nursing home, and if delivery is effected by cesarean section considerable extra expense is incurred and will be repeated at future confinements. Therefore it seems reasonable to assume that if test labors and cesarean sections are practised to the exclusion of the induction of premature labor the birth rate in the upper and middle classes will be reduced even lower than it is at the present time.

NORMAN said that he spoke on the basis of many years experience in maternity work as a general practitioner. In spite of the dangers and the terrors which had been portrayed as associated with the induction of labor he still favors the procedure. Its merits must be judged from its results as compared with those of cesarean section. During his experience of 30 years Norman had had several cases in which cesarean section prevented the woman from having more children. He regards the induction of labor as perfectly safe. He has carried it out both in private practice and in institutions, and had had no poor results. In no case did pyrexia develop.

THEOBALD stated that he believed it is possible to form a very accurate opinion as to whether the head can pass through the pelvis and that the 'pains' can be increased by the exhibition of such drugs as quinine morphine, and scopolamine. He has given up trial labor because of the risk of sepsis although he believes that it may be of advantage in a small number of cases. In his opinion the most common cause for the head's remaining above the brim until after the onset of labor is increased inclination of the pelvic brim. This can be demonstrated and the course of labor prognosticated. In conclusion he stated that the proper time to take steps to avoid operative interference is at the beginning of the first stage of labor.

KERR said that it is impossible in the thirty sixth week of pregnancy to tell whether, in borderline cases, the head will pass through the passage or not. Neither is it possible to determine beforehand, even by roentgenographic pelvimetry and cephalometry, how the head is going to mould in labor or to foretell the strength of the uterine contractions. These very important uncertainties arise in all cases. It is only when labor is in progress that it is possible to prognosticate, with any degree of certainty, whether the

not be given early in all of the cases. As a rule abscess formation can be prevented only when the irradiation is given at the first appearance of the inflammation. Of 34 cases treated by irradiation early, 32 (94 per cent) were cured and small puncture incisions were necessary in only 2, whereas of the 40 cases treated by other measures, only 26 (65 per cent) were cured and large incisions were necessary in 14.

The average dose of roentgen irradiation was 78 r, about 10 per cent of the skin erythema dose. After the irradiation, high bandaging of the breast was done, and if there was pain the milk was pumped out. Beginning 24 hours later at the earliest, compresses were applied until the redness disappeared and the pain ceased. No roentgen injuries of any kind were observed.

In conclusion the author states that the described treatment is of value not only because of its superior results, but also because it prevents or shortens the period of illness by accelerating the abscess formation and is an ambulatory treatment of low cost.

(KARL KOCH) LOUIS NEUWELT, M D

**Colebrook, L.** The Prevention of Puerperal Sepsis. *J Obst & Gynec Brit Emp*, 1936, 43, 691

Colebrook divides puerperal infections into the following 2 groups:

1 Those which are intimately associated in their origin with injury to the maternal tissues during the process of childbirth. The bacterial infections which complicate recovery from these injuries vary greatly in character. The hemolytic streptococcus is by no means always associated with such injuries—probably is not present in half of them—but when it is present the clinical picture is especially alarming. Colebrook believes it is impossible to regard the hemolytic streptococcus as a sharply defined variety or species. He states that the ability to hemolyze red blood cells is a property shared to greater or less degree by several groups of streptococci. Only 1 of these groups is commonly responsible for severe infections in man. Others are responsible for certain infections in animals, e.g., mastitis in cows and strangles in horses. A third group are non pathogenic so far as is known.

2 Those which occur in cases in which labor was accompanied by little or no trauma and are due to the entrance of the hemolytic streptococcus into the genital tract of the mother.

It is known that hemolytic streptococci of the kind causing puerperal fever are present in a great variety of common septic conditions such as tonsillitis, scarlet fever, otitis media, mastoid disease, erysipelas, nasal sinus infection, wound infections of all kinds, burns, whitlows, finger infections, and impetigo. Moreover, symptoms more or less closely resembling those of the common cold or so-called influenza may sometimes be associated with streptococcal infection, and persons without apparent signs of definite infection sometimes harbor hemolytic streptococci in the throat or nose. Recently Cole-

brook has discovered that the air is a potential source of infection.

With regard to the prevention of puerperal infection he draws the following conclusions:

1 The hemolytic streptococci of the respiratory tract, particularly those associated with recent acute infections, constitute the chief menace in maternity work.

2 The healthy carrier is less to be feared than the individual with an acute infection.

3 The danger of invasion by the hemolytic streptococci threatens the parturient woman, not from one direction but from many.

With regard to the prevention and recognition of infection by the hemolytic streptococci, he makes the following statements:

1 Arrangements should be made in advance for the prompt detection of catarrhal and inflammatory conditions of the respiratory tract due to the hemolytic streptococci in the obstetrical personnel before they have caused puerperal infection or disseminated the streptococci.

2 Puerperal infection by the hemolytic streptococcus should be recognized immediately and a likely source of the bacteria in attendants detected.

3 Arrangements should be made for the prompt removal of every infectious case from maternity institutions unless they are provided with an entirely separate septic block with a separately housed nursing staff.

4 Provision should be made against infection of the mother from her own nose or throat or from a member of her household.

5 Some organization of bacteriological services should be arranged in order that the swabs may be dealt with promptly, cheaply, and uniformly.

6 Delivery should not take place in an environment which is likely to be infested with streptococci.

7 A streptococcus infested environment is not likely to be present in institutions.

8 The present system whereby maternity work is conducted by district nurses who are responsible also for the dressing of wounds and attendance upon all sorts of infective cases should be abandoned and all those engaged in midwifery should receive better instruction as to the principal sources of puerperal infection and the sound principles of antiseptics.

In discussing the conduct of labor Colebrook stresses the importance of the wearing of a mask. He states that because of the possibility of air borne infection and the multiplicity of the sources of infection a single act of disinfection is not sufficient for maximum safety and a lasting antiseptic barrier, particularly on the hands and the vulva, is essential. He believes that thorough washing with soap and water is perhaps the most important item in the antiseptic technique. This should be followed by the use of an antiseptic. He recommends the use of dettol, the chief active agent of which is chloroxylenol. He suggests also disinfecting the hands of the patient with the disinfectant.

ALBERT M. VOLLMER, M D

## NEWBORN

Scaglietti O Obstetrical Lesions of the Shoulder  
(*Lesioni ostetriche della spalla*) *Chir & organi di movimento* 1936 22 183

The author reports a study of 199 obstetrical injuries of the shoulder collected at the Rizzoli Institute in the period from 1899 to June, 1935. Among these he was able to distinguish 3 distinct types of lesions: an articular type which occurred in 62 cases, a paralytic type, which occurred in 22, and a mixed articular paralytic type which occurred in 14. There were 101 old or latent cases which could not be classified because the clinical and roentgenographic data were insufficient.

The articular types of lesion Scaglietti divides into (1) simple distortion and (2) detachment of the epiphysis. In both the early symptoms are pain on motion, joint tenderness and immobility of the arm, and the early x-ray findings are absolutely negative. An accurate diagnosis cannot be made until callus formation, which occurs only in the latter, takes place. As ossification of the upper end of the humerus occurs at about the third month after birth the diagnosis is sometimes delayed for a considerable time.

The treatment indicated for simple distortion is immobilization and proper support in abduction. For detachment of the epiphysis the author has found the capsulotomy of Sever combined with the derotative osteotomy of Fatti the best procedure.

In obstetrical paralysis due to injury of the brachial plexus the symptoms are the usual ones of

characteristic position and flaccidity of the arm. The diagnosis is easily made by neurological examination and electrical conduction tests. The treatment indicated is the same as that for simple articular injuries of the shoulder supplemented by massage and electrical stimulation. The author believes that nerve suture, when employed, should not be delayed more than six months after the injury.

Ninety-one and six tenths per cent of the reviewed obstetrical lesions of the shoulder occurred in cases of dystocia. In 75.5 per cent of these cases some form of obstetrical intervention was required. Forty-eight and seven tenths per cent of the injuries occurred in cases of breech presentation and 13.75 per cent in cases of shoulder presentation.

The lesions were more frequent in males than in females, more frequently unilateral (93.4 per cent of the cases) than bilateral (6.5 per cent), and more frequent on the right side (62.8 per cent) than on the left (30.6 per cent).

The author believes that the lesions are always produced during the process of delivery and that their severity varies directly with the degree of violence employed.

In a follow up of infants with the simple articular type of injury it was found that only 1 out of 9 had any deformity. The results in cases of complicated shoulder injuries were also said to be good. In the cases of obstetrical paralysis minor injuries responded well to treatment, but in 8 cases of nerve suture the results in general were unsatisfactory.

GEORGE C. FIVOLA, M.D.

# GENITO-URINARY SURGERY

## ADRENAL, KIDNEY, AND URETER

Costa A., and Severi, L. The Histology and Physiopathological Significance of the Venous System of the Suprarenal Glands (Istologia e significato fisiopatologico del sistema venoso delle capsule surrenali) *Sperimentale*, 1936, 90 321

Costa and Severi made a histological study of 120 suprarenal glands which were taken from individuals of various ages and of both sexes who had died of various diseases and from 20 fetuses whose ages ranged from 7 to 9 months of intra-uterine life.

They found that in the venous system of the suprarenal gland there may be distinguished (1) veins with a connective tissue wall (sinusoids, small central veins), (2) veins with a circularly arranged muscular coat (veins with dense muscle bundles, veins with non protruding muscle bundles, small veins with pillars, large veins with pillars), and (3) veins with a continuous muscular wall (suprarenal veins). The large veins with pillars have a partly muscular and partly capillary wall and may therefore be also called "hemiveins."

As the suprarenal vein is traced distally, there is a gradual reduction of the longitudinal muscular pillars which become more and more separated from the intima until in certain segments, they come to lie outside of the vascular wall (veins with dense bundles). In the more distal segments the musculature disappears (veins with a connective tissue wall, sinusoids).

The radicles of the large veins with pillars are veins with non protruding muscle bundles. Collaterally they receive only the sinusoids which empty in part through the muscular pillars and in part into the segments opposite them.

The longitudinal muscular layer of the venous system of the suprarenal veins has probably a propelling and a stenosing function, the former emptying the veins with pillars and their radicles and the latter affecting the sinusoids which open laterally through the muscular pillars. It is probable that this muscular system of propulsion has the function of responding to sudden demands by the organism for blood rich in adrenalin. Very little blood may be left in the adrenal gland after sudden expulsion, but the system is so regulated that some of the efferent canals are closed.

The muscular pillars are not developed until the end of childhood. They are absent in fetal life and during the first few years of extra uterine life. Therefore hematomas of the suprarenal gland in the newborn are due more to the blood stasis caused by mechanical factors incident to parturition than to direct traumatic action. Hence there occurs a rupture of the blood spaces in the medulla which are not yet completely developed and lack a pro-

pellung muscular tissue. It is possible also that in certain hematomas of the suprarenal glands in the adult (specifically, those of toxic, traumatic, or obscure origin) there occurs, as the result of violent vasomotor phenomena caused by trauma or a toxic agent, a spasm of the musculature of the hemiveins with consequent ectasia and rupture of the capillary portion of the wall. REYNARD E. SOMMA, M.D.

Bouchard-Potocki, R. Rules to be Observed in the Practice of Pyelography (Les règles à observer dans la pratique de la pyélographie) *J. d'urolog. méd. et chir.*, 1936, 42 143.

Bouchard Potocki emphasizes the value of pyelography to the urologist in the solution of certain clinical problems that, without it, would remain unsolved. To obtain the best results from this examination certain rules must be observed.

1 Bilateral pyelography must be done as a routine procedure. Very often patients come to the urologist with pain in the lumbar region definitely localized to one side when the renal lesion is on the opposite side. In cases of renal or ureteral calculus this is sometimes demonstrated by the plain roentgenogram which shows the calculus or calculi on the side opposite the side of the pain. In cases of lesions which can be demonstrated only by pyelography, bilateral pyelography is necessary to determine the nature and location of the lesion.

In the early days, pyelography was carried out with opaque media such as collargol which were evacuated with difficulty from a distended pelvis and might even cause obstruction of the renal tubules if forced into the renal parenchyma with too great pressure. Under these conditions it is not surprising that urologists hesitated to inject such a solution into both pelvis at the same time. Later, the use of sodium bromide as the opaque medium was an improvement, but as even this was often irritating to the mucosa of the urinary tract, pyelography was usually done on only one side at a time. In the last few years the development and use of opaque media which are well tolerated by the organism even if injected into the veins (uroselectan, abrodyl and tenebryl) has removed this objection to bilateral pyelography. Only bilateral pyelography can show the condition in both kidneys. This is true especially in hydronephrosis. Since using this method the author has found that hydronephrosis is more apt to be bilateral than unilateral. He reports 3 cases showing the value of bilateral pyelography—2 cases of bilateral hydronephrosis and 1 case of polycystic kidney on one side and ptosis of the kidney with beginning dilatation of the renal pelvis on the other side.

2 Pyelography should be done with the patient in the erect as well as the recumbent position. This

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GEORGE C. FIVOLA, M.D.

infections nephrectomy should be done as early as possible

He does not see any particular advantage in urinary antiseptics given by mouth or in antiseptic solutions given by vein. However, he regards neoarsphenamine as of value in chronic ascending types of infection. He believes that operation is indicated (1) when the patient cannot combat the disease, (2) in massive abscess, (3) in perinephritic abscess, and (4) in fulminating infection. He discusses operative methods for the different types of lesions.

GILBERT J. THOMAS, M.D.

**Marion: The Evolution of the Kidneys Following the Removal of Calculi from the Kidney, the Renal Pelvis or the Ureter** (*De l'évolution des reins après l'ablation des calculs du rein, du bassinet ou de l'uretère*). *J. d'uról méd et chir*, 1936 42 193

Marion has observed that following the removal of stones from the kidney, renal pelvis, or ureter, complications of 3 types may arise even in the absence of a pre-existing pyelonephritic infection.

In certain cases a pre-existing infection may continue to develop under various influences. The kidney loses its normal function, manifestations of a pyonephrosis appear a few years later, and ultimately nephrectomy may become necessary. Marion has observed 2 cases in which following the removal of renal stones, the kidneys became transformed into large pyonephrotic pockets. Nephrectomy was performed in both.

In another percentage of cases the removal of renal stones is followed by progressive sclerosis of the kidney. The organ becomes atrophic and distorted, and the appearance of the renal pelvis and the calyces in the roentgenograms is atypical. The author reports 3 cases with complications of this type. In one of them severe pain developed post-operatively in the region of the involved kidney. Subsequent clinical examination revealed a disturbance of the functional capacity of the kidney. The pyelograms showed a completely altered picture of the renal pelvis and the calyces. On gross examination after nephrectomy the kidney was found completely sclerosed and atrophied. Marion believes that in this case the renal infection had continued to progress in an attenuated form.

In cases of ureteral stone the lumen of the ureter may become completely obliterated. In a case observed by the author the patient had had several attacks of renal colic during one of which the lumen of the ureter became obliterated. The obliteration led to extensive atrophy of the corresponding kidney. In another case, a few weeks following nephrotomy for ureteral stone, the lumen of the ureter became completely obliterated at the site where the stone had lodged. The author attempted to re-establish the continuity of the ureter, but failed because of the presence of a severe periureteritis.

From these observations Marion concludes that the removal of renal and ureteral stones calls for a

reserved prognosis because complications such as pyonephrosis, renal sclerosis, and ureteral obliteration may arise. Such accidents are serious as they may result in complete destruction of the kidney.

RICHARD E. SOMMA, M.D.

**Serrallach, N., Serrallach-Julia, F., Jr., and Amell y Sans, A. Biological Methods of Compensation in Ureteral Obstruction** (*Sur les mesures biologiques de compensation dans les obstructions urétérales*). *J. d'uról méd et chir*, 1936 42 5, 166

It is recognized today that urinary retention in the renal pelvis and ureter is the *primum moriens* of almost all pathologic changes in the upper urinary tract. The organism uses all its resources to combat the consequences of such obstruction. Descending pyelography has shown that when there is complete obstruction of a ureter, the kidney does not secrete for several days, but if the obstruction is relieved the kidney becomes functionally active again. The investigations of Bazy, Tuffier, and others have shown that uronephroses are soon transformed into hydronephroses, that retained urine loses its chemical characteristics and becomes like blood serum as the result of osmotic exchange. This is a process which prolongs the life of the kidney because it eliminates certain toxic elements from the retained urine. It is well known that if the ureter is sectioned accidentally or intentionally in the course of an abdominal operation, the patient does not have pain, fever, or symptoms of uremia such as result from urinary retention due to obstruction of the ureter by a calculus, stricture, or clot. While theoretically the 2 processes are identical in that both result in stagnation of urine in the upper urinary tract, the reaction of the organism is entirely different.

The authors carried out experiments on guinea pigs and rabbits to determine the processes of "compensation" that protect the kidney against injuries resulting from urinary retention in the renal pelvis and the ureter. One or both ureters were ligated under local anesthesia and the retained urine obtained by puncture and studied at various intervals. In several experiments the ureter was filled with uroselectan after the urine was drained off and studied roentgenographically. The investigation was completed by histologic studies.

The ligation of a ureter caused little disturbance of the animal's general condition, but ligation of both ureters caused severe shock and death within twenty-four hours.

The ureter dilates throughout its length both above and below the ligature. Its outer surface is covered with a rich network of blood vessels. Ligation of the ureter is followed immediately by complete cessation of the secretion of urine of varying duration which in turn is followed by oliguria. The duration and intensity of the oliguria depend upon the intra-ureteral pressure. When the ureter is emptied by puncture, the quantity of urine is increased. When the secretion of urine is renewed

after the initial period of anuria the intra ureteral pressure rises to about 60 mm Hg. This increase tends to arrest the secretion of urine again unless the pressure is reduced by relaxation of the walls of the pelvis and ureter and absorption of a portion of the fluid retained or as in the experiments, by puncture. Thereafter the quantity of stagnant urine depends upon the tonus of the walls of the upper urinary tract and especially upon the balance established between the secretory activity of the parenchyma and the power of absorption of the walls of the renal pelvis and ureter.

The authors are of the opinion that the period of survival of the obstructed kidney is prolonged first by the primary anuria followed by oliguria then by the pyelo ureteral absorption and finally by the collateral circulation established. Anything that injures the unobstructed kidney and tends to increase the toxemia injures the obstructed kidney and shortens its life. Pyelovenous reflux and perirenal interstitial infiltrations are complications of the process of defense since the latter depends, on the one hand upon checking the secretion of urine and on the other upon absorption of the excess of the urine that is secreted. The authors found that the absorption takes place chiefly in the terminal portion of the ureter and in the small calyces of the pelvis where the arrangement of the epithelial cells shows definite evidence of adaptation to absorption.

The cessation of pain in cases of complete obstruction of the ureter usually depends upon the cessation of urinary secretion and diminution of the intra ureteral pressure. However it must be admitted that there may be renal colic due purely to spasm without an increase in the intra ureteral pressure since the ureteral muscle is as subject to cramps as all other muscles. ALICE M. MEYERS

Schillings M. and Sondervorst F. A. Primary Malignant Tumors of the Ureter (Les tumeurs malignes primitives de l'uretère). *Rev. belge d'ac. mèd.* 1936 8 225.

Until after the beginning of this century primary tumors of the ureter were never diagnosed clinically. They were confused with tumors of the kidney and recognized only at autopsy. Finally a few were discovered by endoscopic examination at first done with hesitancy and then more systematically. Finally they attracted the attention of urologists and now with the perfection of endoscopic and roentgen technique they are quite frequently diagnosed and if the diagnosis is made early they may be cured.

The authors review the history of primary malignant tumors of the ureter, summarize in a table 112 cases they have collected from the literature, and report 2 cases coming under their own observation.

The first of the authors' cases was that of a man sixty-eight years of age who came for consultation on account of hematuria. After cystoscopic and roentgen examination a probable diagnosis of tumor of the kidney was made, and in March, 1931, the

right kidney and upper end of the right ureter were removed. Histologic examination disclosed only signs of chronic interstitial nephritis. On January 11, 1936, the patient was free from signs of recurrence.

The second case was that of a woman seventy-three years of age who came for treatment on account of pain in the kidney region and progressive emaciation. After careful examination a probable diagnosis of tumor of the right ureter was made. Operation disclosed a tumor of the upper end of the ureter so extensive that it could not be extirpated and a metastasis in the lower pole of the kidney. The neoplasm was a pavement cell epithelioma of the ureter with metastases in the kidney, the retroperitoneal glands, the lumbar and iliac muscles and the parietal peritoneum. The patient died that night of heart failure.

As the 3 classical symptoms—hematuria, pain, and hydronephrosis—are not at all pathognomonic a very careful examination must be made by simple roentgenography of the urinary tract, intravenous or descending pyelo-ureterography, cysto copy, chromocystoscopy, catheterization of the ureters, retrograde or ascending pyelography and, if necessary as in cases of very small or very large tumors, pneumopyelography.

The only treatment that gives any hope of permanent cure is nephro ureterectomy in 1 or 2 stages with a large single incision or a double incision. If possible the operation should be performed in 1 stage. If it must be in 2 stages the ureterectomy should be performed first. If the tumor is at the lower end of the ureter a considerable area of bladder tissue around the opening should be excised. Partial nephro ureterectomy or segmental ureterectomy is sometimes followed by cure. The indications for these operations are determined by the nature of the tumor, its localization, the condition of the renal parenchyma and the integrity of the part of the ureter that is not removed. After operation the patient should be kept under close observation.

Thermocoagulation and diathermy are not to be advised as their results are very mediocre. Roentgen therapy and radium therapy may be used in inoperable cases. As a rule they merely relieve the pain. Medical treatment is purely symptomatic. It is possible that chemotherapy of cancer may eventually be the treatment of choice, but as yet its effectiveness has not been proved.

ANDREW GOSS MORGAN, M.D.

## BLADDER URETHRA, AND PENIS

Lett H. On Urinary Calculus with Special Reference to Stone in the Bladder. *Brit. J. Urol.* 1936 8 205.

Among 279,569 patients admitted to the surgical wards of the London Hospital during the years from 1901 to 1931 there were 2,781 with stone in the urinary tract. Lett has grouped the cases of stone into five year periods and shows the incidence of

such stone in men, women, and children. He discusses the frequency with which stone was found in the various parts of the urinary tract and the incidence of urinary stone formation in relation to sex and age. The findings of urinalyses are presented in a table. In the majority of 745 cases the urine was acid, no matter what the situation of the stone in the urinary tract.

There were 636 cases in which the author was able to obtain satisfactory cultures. The types of organisms are shown in a table. *Staphylococcus albus* was found in the majority of the cases, whether the stone was located in the kidney, ureter, or bladder. *Bacillus coli communis* was next in frequency, regardless of the site of the stone. The *bacillus proteus* was found most often when the stone was in the lowest part of the urinary tract.

The findings of complete microscopic examination of the urine are presented in a table. As would be expected, leucocytes were found more often than red blood cells. The incidence of blood or red cells in the urine was 73 per cent. In about two thirds of the cases the urine contained crystals. In nearly all of them triple phosphate and calcium oxalate were present. Frequently on re-examination a change in the triple phosphate to calcium oxalate, or vice versa was found. Uric acid crystals were observed in only 4 cases.

In discussing stone in the bladder Lett cites a report made in 1819 on 506 cases in which operation was performed at the Norfolk Hospital in Norwich. Two hundred and thirty-five of the patients were children under fourteen years of age. The high incidence of bladder stone in children was attributed to dietary defects as the stones occurred most frequently in children of the poorer classes and were rare in children who were well fed. In men the incidence of stone in the bladder increases rapidly up to between the forty-fifth and fifty-third years of age, then declines slightly, and at the age of eighty-nine or ninety years shows a marked decrease. Lett found 43 stones in women and 7 in young girls. In 8 of 19 cases of stone in the bladder which he treated there was a descending stone with no history of colic. In 1 case a diverticulum of the ureter was found. In 3 cases the stone formed around a foreign body introduced into the urethra, in 6 cases it followed injury and by hysterectomy, and in 1 case it followed an injury to the bladder during cesarean section.

Lett describes the various symptoms which may be produced by bladder stone in males and females according to the position or activity of the patient and the size, shape, and composition of the stone. He discusses interruption of the urinary stream, which he states occurs in approximately 17 per cent of cases. In 13 of his cases incontinence occurred, but he states that this is very rare except in children and under certain conditions in adults. Of 262 cases, hematuria occurred in 90 (60 per cent). Lett believes that hematuria is not so frequent as is commonly supposed. He states that pus in the urine

is to be expected in somewhat more than one third of the cases, and that microscopic examination of the urine will reveal leucocytes in four-fifths of the others.

He states that pain, frequency, and hemorrhage are aggravated by exercise and jolting. He discusses the diagnosis of bladder stone on the basis of clinical evidence and the use of the sound. Today, as the result of the development of roentgenography and cystoscopy, this method has lost favor. However, as no one method can be relied upon to be infallible in every case, it is advisable, and sometimes essential to employ all methods.

In reviewing the development of various types of operation for bladder stone, Lett discusses the relative merits of suprapubic cystostomy and removal of the stone with a lithotrite. He believes that the urologist with little experience in urethral and bladder surgery will obtain more successful results from the former procedure. GILBERT J. FROST, M.D.

Godard, H. Plastic Operations on the Urethra (Les urotoplasties). *J. d'urolog. mèd. et chir.*, 1936, 42: 105.

Godard, in a general review of plastic operations on the urethra for the treatment of hypospadias and loss of substance of the male urethra, states that the number of operations proposed is "amazing." This is due in part to the fact that in plastic surgery the personal factor is of the greatest importance. A surgeon may obtain good results with an operation devised by himself although, when performed by others, it proves unsatisfactory. In France 5 techniques are widely used at the present time. These are the Beck von Hacker, Duplay Marion, Ombredanne, Nove-Josseland, and Mathieu techniques.

The various procedures employed in plastic operations on the urethra are classified according to the type of operation and also according to the particular indication. To repair a defect in the penile urethra the following types of operation are performed: (1) the simple formation of a tunnel, (2) procedures based on the extensibility of the urethra, (3) plastic methods with the use of pedicled flaps from the penis, prepuce, or scrotum, and (4) plastic methods with the use of autoplasmic, homoplasmic, or zooplasmic free grafts. The procedures for repair of the penile urethra are: (1) mobilization and extension of the urethra, (2) plastic procedures with the use of pedicled flaps from the perineum, and (3) plastic procedures with the use of pedicled grafts from the scrotum.

The author states that loss of substance and hypospadias in the region of the glans penis may be treated by the Beck von Hacker, Bevan, Chocholka Marion, or Ombredanne methods or their modifications. Loss of substance and hypospadias in other portions of the penile urethra may be treated by the Duplay Marion, Ombredanne, Chocholka Marion, or Nove-Josseland Rochet method. Godard is of the opinion that the Ombredanne operation is the



only one which may be used for all of the usual types of hypospadias with practically no variation in the technique. He points out that contrary to what might be expected posterior hypospadias (penile penoscrotal or perineal) is more easily corrected than glandular hypospadias.

Defects of the perineal urethra may be treated by procedures of mobilization and extension of the urethra (Mikulicz-Elehorn). The hermaphrodite type of hypospadias (vulviform hypospadias) requires not only several plastic operations but in some cases reconstruction of the genitals to conform with the true sex. The author believes that in such cases the operation should not be attempted before puberty and not until the sex has been determined by laparotomy or if necessary histologic examination of the gonads.

Of the plastic operations based on the extensibility of the urethra the Beck von Hacker procedure is most favored. It is indicated however only in hypospadias at or very near the glans. It is usually done before the end of the second year of life. The author is of the opinion that even in the cases in which it is chiefly indicated this operation may have serious complications and undesirable end results such as fistula, stricture or deformity of the penis. A number of surgeons who have used it have abandoned it.

In plastic operations with the use of pedicled flaps certain principles are generally recognized. In plastic operations on the penis satisfactory results require the use of flaps having essentially the same texture and the same elasticity as the tissue they are to replace. These requirements are met best by the penile and scrotal skin. The flaps should be sufficiently large to insure their vitality so that necrosis will not occur. Tension on the sutures must be avoided. The procedure used should be such that in case of failure it will not make the anatomic condition worse than the original malformation. The favorable age for operation for hypospadias by any of these methods is between the sixth and ninth years of age. In cases of loss of substance due to trauma or other causes operation should be delayed until cicatrization is complete. The end results of all these operations should be more carefully studied and reported.

In the Duplay-Marion-Thiersch-Bevan-Chocholka-Marion and Mathieu techniques the penile skin is used for grafts. The techniques of Thiersch and Bevan are little employed at present. The Duplay-Marion technique is not suitable for hypospadias in the region of the glans and when used to reconstruct the urethra in penile or penoscrotal hypospadias must often be completed at a later date by some other procedure such as the Chocholka-Marion operation. In the operation first described by Chocholka and perfected by Marion the penile-graft is sutured over a Nelaton tube which is later removed. This procedure has given good results in a few cases but there have been no reports of its use in a large series of cases.

Among the methods in which combined flaps from the penis and prepuce are used are those of Ombredanne, Birkenfeld, Russel, Gersuny, and Meyer. The technique of Ombredanne can be employed in any of the usual types of hypospadias and does not necessitate derivation of the urine. The chief objection to it is that it must be done in several stages. It is more widely used than any other method and gives good results when performed by most surgeons. The other methods of this type have been derived to a large extent from Ombredanne's technique. They have given good results in the hands of their originators but have not been widely used by others.

In other methods a graft from the prepuce alone is used. As a rule this graft is too long and narrow and is liable to undergo necrosis. Moreover, such methods have limited indications. Other pedicled grafts—grafts from the abdominal skin (in 1 instance a tube graft) and from the bladder mucosa—have been used.

Of the methods in which free grafts are employed the procedure of Nove-Josserand with the use of an autogenous dermal-epidermal graft has been more widely used than any other of this type. Nove-Josserand has reported satisfactory results from this method but others have not equaled his results. The method demands prolonged postoperative care. In a few cases tissues other than the skin have been used for free grafts. In the heteroplastic graft operations various tissues have been employed. None of these operations has given satisfactory results and only a few have been attempted. The essential fault of free grafts in the treatment of urethral lesions (hypospadias and loss of tissue) is that they tend to heal by the formation of cicatricial tissue which necessitates prolonged postoperative treatment by dilatation or urethrotomy. Therefore their use has been generally abandoned.

The article contains illustrations showing the techniques of many of the operations mentioned.

ALICE M. MEYERS

## GENITAL ORGANS

Chauvin L. Primary Tuberculosis of the Seminal Vesicles. (*La tuberculose primitive des vésicules séminales*). *Arch. d. mal. d. reins et d. organes génito-urinaires* 1936 10 63.

Contrary to general belief tuberculosis of the seminal vesicles may be the primary lesion in genito-urinary tuberculosis and localization of tuberculosis elsewhere particularly in the epididymis secondary. This has been demonstrated by numerous observations. Of 26 cases of genital tuberculosis coming to autopsy, Guyon found the seminal vesicles alone involved in 2. Similar cases have been reported by Saxtorph, Simonds and Barbelion, Astraldi and Lancereaux have seen tuberculous epididymitis retrogress after section of the vas deferens.

In the seminal vesicles any of the forms of tuberculous inflammation may occur but nodular tu-

bercles are most common. It is of importance that even massive caseation remains limited by a thick fibrous wall and seldom produces fistulas. Healing occurs by fibrosis, encystment, and, occasionally, calcification.

Among the manifestations of primary tuberculosis of the seminal vesicles are hemospermia, hematuria, pollakiuria, urethral discharge, perineal pains, spontaneous erections, rapid and painful ejaculation, and spermatorrhea.

On rectal examination the seminal vesicles are found large and usually nodular. Occasionally, with massive caseation, they have a waxy consistency. Induration combined with a remarkable freedom from pain on palpation is the chief characteristic differentiating tuberculous from other forms of seminal vesiculitis.

The diagnosis is difficult. The urinary disturbances suggest a renal lesion, and localization of the tuberculous process in the seminal vesicles is possible only by systematic study. A urethral discharge which has been chronic from the beginning is always suggestive. However, this is rare. As a rule the physician is confronted by the problem of distinguishing the lesion from a chronic gonorrheal lesion. The tubercle bacillus may be found in the urethral discharge or in the urine. Its presence after lavage of the bladder and massage of the vesicles is especially suggestive.

The treatment is essentially medical. Surgical treatment is limited to section of the vas deferens to prevent extension of the tuberculous process to the epididymis. This procedure nearly always accomplishes its purpose. ALBERT F. DE GROAT, M.D.

# SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS

## CONDITIONS OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC

Petersen G Fr A Case of Osteopikilosis *Acta radiol* 1936 17 388

Osteopikilosis a condition characterized by an irregular spotted appearance of the bones is known also as disseminated condensing osteopathy and "generalized condensing osteitis".

The spots are due to areas of increased density varying from a few millimeters to 2 cm in diameter. They are most numerous in the ends of the long bones and in the bones of the hands, feet, and pelvis.

By most of those who have written on the subject osteopikilosis is considered an anomaly, but in some cases it is associated with enough pain to suggest pathologic changes. It is rather rare and usually discovered only incidentally during roentgen examination for some other condition. Skin lesions in the form of raised efflorescences may be present on the abdomen, back, arms, and thighs and neuropathic symptoms such as vasomotor instability, tremor, and neuralgias may occur.

In some cases the affection is hereditary. Although developmental, infectious, and congenital origins have been suggested its cause is unknown. No abnormalities of the parathyroid glands or of the calcium content of the blood have been noted.

In the diagnosis the question of metastatic carcinoma may arise but this condition can usually be ruled out by the history and the more generalized disturbance in osteopikilosis. Although osteopikilosis was first described by Albers-Schönberg it must not be confused with "marble bones", a disease which bears his name and has nothing in common with it.

The case reported by Petersen was that of a man thirty-four years of age who complained of pain in the left scapular region following a fall. On roentgen examination numerous opaque calcareous spots from 2 to 5 mm in diameter were found in the head of the humerus and the glenoid. Further search revealed lesions of the same type in all of the long bones where they were massed most densely near the joints, in the bones of both hands and feet, and in the pelvis especially the ischium and pubic bones. There was a pronounced spondylitis deformans and exostoses were found on the right tibia and femur. Movements of the shoulder joint were painful. The spine was stiff and there was an arcuate kyphosis. The skin in the interscapular region showed patches of pityriasis versicolor.

The blood count, hemoglobin, and blood pressure were normal. The calcium content of the blood was 11.7 mgm per cent. The Kahn test was negative.

The patient's family history as well as his personal history revealed nothing of significance but

roentgenograms of his mother showed some degree of atrophy of all of her bones and a small round opaque spot in each of the fifth metacarpal bones, those of one brother, a small but distinct cavity in the left lunate bone, and those of another brother opaque spots in the heads of the metacarpal and metatarsal bones and in the distal epiphysis of the radius.

WILLIAM ARTHUR CLARK M.D.

Goin L S and Carroll R L Primary Bone Tumors in Children *Radiology* 1936 27 261

The authors report their findings in 117 cases of primary bone tumor in children. Eighteen and six tenths per cent of the tumors were malignant. On the authors' service the general incidence of bone tumor has been 1 tumor to 180 admissions and the general incidence of malignant bone tumor 1 tumor to 338 admissions.

The authors classify bone tumors into (1) those arising from osteogenetic elements, (2) those arising from tissues within bone, and (3) those which are metastases in bone.

In the first group are osteomas, osteochondromas, exostoses, chondromyxomas, enchondromas, and chondromas. Osteomas, osteochondromas, and exostoses are usually benign and occur under the age of twenty years. In cases of osteoma and exostoses simple excision is sufficient as a rule, but for those of osteochondroma the authors recommend postoperative irradiation as tumors of this type sometimes have a tendency to recur.

Chondromyxomas, enchondromas, and chondromas are rather common. They are central tumors expanding the bony tissue which arise from cartilage cells and occur in the diaphyses near the epiphyses. They produce no bone. They are most frequent in the first 3 decades of life. Because of their tendency to recur which makes them potentially malignant, excision should be followed by irradiation.

Malignant chondrosarcomas are divided by the authors into the primary and secondary types. Those of the primary type include the periosteal sarcomas with their characteristic "sun ray" arrangement. These tumors often become very large and metastasize rather late. As they are extremely malignant they are best treated by amputation. The tumors of the secondary type include neoplasms presumably arising from embryonal rests within a benign lesion. They are very infrequent in children and much less malignant than the primary tumors. They are best treated by amputation with intensive pre-operative and post-operative irradiation.

By the term "osteogenic sarcoma" the authors designate sarcomas causing home production. The most common sites of these tumors are the femur, tibia, and humerus. Their growth extends over

periods ranging from two weeks to four months. The swelling is fusiform, the pain steadily grows more severe, mild fever and moderate leucocytosis are not infrequent, and the more highly malignant growths may destroy life within a short time. The authors divide osteogenic sarcomas into the osteolytic and osteoblastic types. The former are the more malignant.

In their discussion of bone cysts the authors include only solitary cysts occurring in the metaphyseal portions of long bones. These tumors occasionally cause no symptoms. They respond well to either surgery or irradiation. They must be differentiated from solitary bone abscess, chondroma, myeloma, and the osteolytic form of osteogenic sarcoma.

The giant cell tumors are closely related to bone cysts. The authors believe they may be merely variants of the latter. In one half of their cases there was a history of injury. The average age of the patients at the time of their admission to the hospital was fourteen years. Giant cell tumors always arise in the region of the epiphysis. The symptoms are moderate pain and a varying degree of swelling. The authors prefer roentgen therapy to surgery. They believe that in spite of the occasional report of a malignant giant cell tumor, neoplasms of this type are to be regarded as benign.

In their discussion of tumors arising from tissue within bone the authors consider the diffuse endothelial myeloma or Lwing's tumor. They believe that this neoplasm is by no means rare as there were 6 cases in their series. The average age of their patients was ten years. The symptoms had been present for from six weeks to six months. In all of the cases the condition had been diagnosed at one time or another as osteomyelitis. The important differential points between Lwing's tumor and osteomyelitis are summarized by the authors as follows:

	EWING'S TUMOR	OSTEOMYELITIS
Temperature	Usually 99 to 100 degree, but may go higher. In 1 case it reached 103.9 degrees.	From 102 to 105 degrees F.
Blood Leucocyte count	Usually from 9,000 to 11,000 rarely higher.	From 10,000 to 15,000 or higher.
Differential count	Polymorphonuclear cells normal or decreased; lymphocytes increased.	Polymorphonuclear count increased.
Röntgen findings	Appear early.	No demonstrable early changes.
Röntgen treatment	Followed by improvement promptly.	No change in symptoms.
Aspiration biopsy	May permit positive diagnosis.	
Sequestrum	Absent.	Present later.
Exosteam	Stripped with flapping at point of reflection.	Intact unless broken through as for pus drainage.

The authors believe that in cases of Lwing's tumor death is usually due to metastasis, and that under no circumstances should surgical interference

with the tumor itself be attempted. The treatment of choice appears to be irradiation.

They express doubt that myeloma occurs in children as they have found it only in young adults and older persons.

They state that fibrosarcoma and neurosarcoma are rare tumors and, properly speaking, not bone tumors but neoplasms of fibrous and nerve tissues invading bone.

Tumors which are metastases in bone are merely mentioned as they are not primary bone tumors.

The authors conclude that primary bone tumors are common in children and occur most frequently in regions of bone where growth is most intense and at the age when growth is most rapid.

PAUL C. COLOVNA, M.D.

Taylor, G. D., Ferguson, A. B., Kasabach, H., and Dawson, M. H. Roentgenological Observations on Various Types of Chronic Arthritis. *Arch. Int. Med.*, 1936, 57, 979.

The authors report the findings of a roentgen study made in 300 cases of the common varieties of chronic arthritis with particular attention to the rheumatoid and osteoarthritic types. The patients were seen in the Arthritis Clinic of the Presbyterian Hospital, New York, and at the New York Orthopaedic Dispensary and Hospital. Rheumatoid arthritis and osteoarthritis were considered separate clinical entities.

The roentgenologists in the investigation, Ferguson and Kasabach, were given no clinical information regarding the patients except the duration of the symptoms and the degree of function present in the joint. Six of the outstanding changes observed—decalcification, production of bone, destruction of

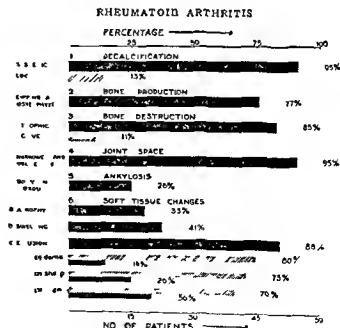


Fig. 1 Observations on patients with rheumatoid arthritis

## OSTEO ARTHRITIS

## PERCENTAGE

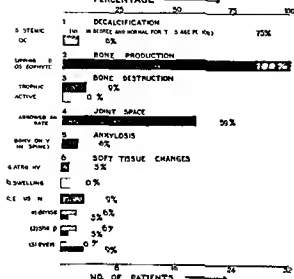


Fig 2 Observations on patients with osteoarthritis

## TUBERCULOUS ARTHRITIS

## PERCENTAGE

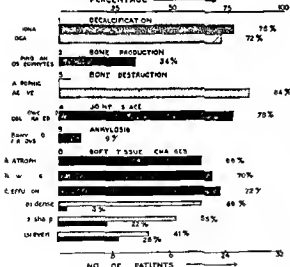


Fig 3 Observations on patients with tuberculous arthritis

bone ankylosis changes in the joint spaces and changes in the tissues—are discussed in detail and their incidence in cases of rheumatoid arthritis, osteoarthritis, and tuberculous arthritis is shown by graphs.

Attention is called to the fact that in each type of chronic arthritis studied the roentgen findings showed a basic grouping or pattern. The authors

emphasize that more than one area should be examined, and that regardless of the joint of which the patient complains, roentgen examination of the hands, feet and knees, and of the lumbar portion of the spine should be made. They believe that information obtained by careful study of the shadows produced by the periparticular soft tissues is of great importance in the differential diagnosis of the various forms of chronic arthritis. They state that to interpret the roentgen shadows correctly the roentgenologist must know at least the duration and severity of the symptoms in the joints. These facts are of the greatest importance in establishing the diagnosis as the appearance of a gonococcal joint of six weeks' duration may closely resemble that of a tuberculous joint of six months' duration. On the basis of the roentgen findings the authors conclude that rheumatoid arthritis and osteoarthritis are distinct entities, and that even when both types occur in the same patient it is usually possible to differentiate the characteristic changes of each in the roentgenogram.

They emphasize particularly that while no single roentgen feature is diagnostic of any one type of chronic arthritis, the roentgen findings in each type are characterized by a basic pattern or grouping which is in agreement with the clinical diagnosis. Therefore roentgenograms carefully interpreted are of definite aid in the diagnosis and in determination of the prognosis of the various types of chronic arthritis.

PAUL C. COLONNA, M.D.

Gulleminet M. Spondylolisthesis (1e spondylolisthesis). *Rev d'orthop*, 1935 43 35.

While spondylolisthesis was a long time regarded as only an anatomical curiosity and a possible source of difficulty in obstetrics it is now considered a problem in surgical orthopedics. It is the slipping of a vertebra on the vertebra below it—usually of the fifth lumbar vertebra on the sacral. As a rule the body of the fifth lumbar vertebra extends only partly beyond the edge of the sacrum or balances on it. In addition to the displacement it undergoes a deformity which results in fixation rendering replacement impossible.

The cause of spondylolisthesis is generally a spondylolysis that is, the presence of a transverse fissure which divides the fifth lumbar vertebra into an anterior and a posterior half. The anterior half slips forward. The fissure can be seen easily in the dry bone but in the living subject is less readily detected as it is covered with periosteum. It is a sort of lateral spina bifida. The author believes the condition is of congenital rather than traumatic origin and that trauma merely makes manifest an anomaly that was already present in latent form.

Spondylolisthesis may be even more frequent in males than in females. The majority of the subjects are between twenty five and fifty years of age but many of them are less than fifteen years old. In the latter the condition is generally acknowledged to be congenital.

The clinical appearance of the patient is characteristic. The trunk is pushed forward, the waist measurement is decreased sometimes several centimeters, the ilioacral space is decreased or abolished, and there are large skin folds parallel with this space. Because of the disproportion the arms appear abnormally long.

The chief symptom is pain which is often so severe as to incapacitate the patient completely.

Clinical diagnosis is possible and is definitely confirmed by roentgen examination. The frontal roentgenogram is not sufficient for absolute diagnosis, profile roentgenograms should be taken also. They show the extent to which the vertebra has slipped and any reactional ossification. The author presents illustrative roentgenograms. With the improved apparatus in use at the present time the spondylosis can also be demonstrated.

Orthopedic treatment with corsets may be used but requires a long time and often fails. Anatomically there is no ideal surgical treatment with complete replacement of the displaced vertebra. In the cases of patients with heart, lung, or kidney disease, diabetes, or obesity operation should not be attempted. It is generally contra-indicated also after the fiftieth year of age. However, Wilson operated on a woman sixty years old. Surgical treatment is not dangerous as in the 42 surgically treated cases reported there was only 1 death.

If the roentgenogram shows that the fifth lumbar vertebra is only moderately displaced and still has good support on the sacrum, osteosynthesis by a posterior graft may be done. The double paraspinous graft is perhaps surer than the Albee graft. However, when there is very marked displacement arthrodesis is to be preferred to posterior osteosynthesis. There are 2 techniques for ilio-transverse arthrodesis—that of Lance and Auroousseau and that of Mathieu and Demirleau. Both of these are shown in illustrations. In the latter which the author regards as the simpler, a tibial graft is passed through the iliac bone and fixed in a slit in the transverse process of the fifth lumbar vertebra. Operation for spondylolisthesis should be preceded by rest in bed with continuous traction and should be performed on a plaster bed. After the operation the patient should be kept in bed for three or four months and should wear a plaster corset when he first gets up.

Atypical forms of spondylolisthesis are discussed briefly.

The article is followed by a long bibliography.  
 AUBREY GOSWORTHY M.D.

Boudreaux, J. Primary Tumors of the Spine (Les tumeurs primitives du rachis). *J. de chir.*, 1936 48 352

Primary tumors of the vertebrae are of course rare in comparison with secondary tumors, but the exact proportion between the 2 types is not known. Schlesinger reported that in 35,000 autopsies 107 vertebral tumors were found and that 41 were pri-

mary, but the author is of the opinion that some of those believed to be primary were secondary. Boudreaux reports 11 new cases of primary tumor—1 myeloplasmioma, 3 giant cell tumors, 3 angiosarcomas, 2 chondromas, and 1 solitary cystic tumor.

The malignant tumors of the spine are myelomas, Ewing's tumors, osteosarcomas, fibrosarcomas, and chordomas. The most common of these are the myelomas. Myelomas may involve several vertebrae. The bone is softened and the cortex thinned. Later the body may collapse or buds may extend into the canal and compress the cord. Histologically, in addition to the true myeloma, it is necessary to recognize the plasmocytoma, which progresses more slowly. The symptoms are gradually developing deep rheumatic pains followed by severe nerve root pains. As a rule the condition is fatal in from one and a half to three years. The cause of death is usually medullary compression. Radiotherapy gives temporary relief.

Ewing's tumor (reticulum endotheliosarcoma) is rare in the spine. It occurs in young persons and usually has a costovertebral location. It may be accompanied by fever. It responds to irradiation therapy, but is ultimately fatal as a rule within two years.

Osteosarcomas and chondrosarcomas of the vertebrae are rare. They occur in young adults, usually in the thoracolumbar region. Sarcoma of a vertebral body generally compresses the cord while sarcoma of a vertebral arch generally does not invade the canal. These tumors resemble osteogenic sarcomas of the long bones in their gross and microscopic characteristics. Roentgenograms show simple osteolytic destruction. The prognosis is poor, death usually occurring in several months. Irradiation is the only treatment.

Perineural fibrosarcomas are a poorly known group of tumors which progress slowly and are of low grade malignancy.

Chordomas are vestigial tumors derived from the remains of the notochord. They occur in late adult life. Seventy occurring in the sacrococcygeal region and 22 occurring in the spine itself have been reported. Intracranial occipital chordomas have also been observed. Chordomas are infiltrating and whitish, often cystic, and at times encapsulated. Histologically they are characterized by large bulbous cells, the "physaliphorous cells" of Virchow. In spite of their relatively benign appearance, they are malignant. Many of them can be removed, but recurrence is the rule.

The benign tumors of the spine are giant cell tumors, hemangiomas, chondromas, and certain unusual neoplasms.

Giant cell tumors may occur at any level in the spine—both in the bodies and in the arches of the vertebrae. They vary from small localized neoplasms to large diffuse, destructive growths. Many are preceded by trauma. Several vertebrae may be involved, but the intervertebral disks are respected. As a rule the neoplasm causes a poorly localized

pain which increases slowly over a period of from six to twelve months. Paraplegias often develop. A slight painful kyphosis or a palpable tumor may be felt. The roentgenogram is not diagnostic. As a rule it shows osseous destruction. If untreated a tumor of the body of a vertebra leads to fatal compression of the cord. Surgical removal is difficult and dangerous because of hemorrhage. The incidence of recurrence is about 50 per cent. A recurrence may behave like a true sarcoma but at times after a period of growth it decreases in size and becomes ossified.

Angiomas are more frequent. There are reports of their discovery in 11 per cent of subjects coming to autopsy. Often they are found accidentally in routine roentgen examinations of the spine. They occur at all ages and are often accompanied by epidural angioma. In 65 per cent of cases only 1 vertebra is involved. As a rule this vertebra is in the thoracolumbar region. The bone is porous and shows multiple small channels filled with blood which are separated by thin trabeculae. As the tumor grows the bone may become enlarged but its density decreases and collapse may occur. The tumors develop slowly. Operation is difficult because of the danger of hemorrhage.

Chondromas are rare. Only 27 cases have been reported. They occur most frequently in the third decade of life. They may be multiple and are sometimes associated with osteogenic disturbance. Their most frequent site is the thoracic region. The tumor may involve the arches or the body of the vertebra. In the latter it may extend into the canal or pass through the foramen to form an hour glass tumor. In about half of the cases several neighboring vertebrae are involved. Roentgenograms may be helpful in the diagnosis. The tumors develop slowly but the danger of paraplegia and of sarcomatous degeneration demands their removal.

Among the rare primary tumors of the spine are lipomas, periosteal fibromas, osteomas and cysts.

In general the differential diagnosis of primary tumors of the spine is difficult as the signs, symptoms and roentgen appearance of all such neoplasms are much the same. In some cases biopsy can be done. The possibility that the tumor is a secondary neoplasm must be ruled out. The treatment also is difficult as a rule. Tumors of the processes and laminae are relatively easy to reach but those of the body are hard to expose. In the lumbar region the latter can be approached by an anterior subperitoneal route. Otherwise they must be reached laterally after costotransversectomy or if there is compression of the cord posteriorly by laminectomy. Some of the malignant tumors should be treated by irradiation.

MAN M. ZINNBERG, M.D.

Rendich R. A. and Shapiro A. V. Osteitis Condensans Illi. *J. Bone & Joint Surg.* 1936 18 499

The condition discussed by the authors is a roentgenologically demonstrable localized area of increased density of variable size in the inferior and

medial portions of one or both iliac bones adjacent to the sacro iliac joint. The sacro iliac joint is not involved and there are no evidences of arthritis. The process may spread upward even to the iliac crest. Its outer border fades gradually into normal bone. It was previously described as a unilateral condition occurring in women after pregnancy but the authors have observed 4 cases in which it was bilateral and have seen it in the pelvic roentgenograms of 3 males.

The symptoms are not constant. In some cases there are no symptoms. Several of the authors' patients had a definite low back pain aggravated by bending. Localized tenderness and muscle spasm may be present. The cause is not known. Trauma is not a probable factor. Circulatory disturbances and low grade infection in the bone are possibilities. In their series of cases the authors excluded other bone lesions known to produce sclerosis.

CHESTER C. GUY, M.D.

Cohen Solal L. Acute Primary Suppurations Developing in the Sheath of the Psoas (*Les suppurations aiguës primitives développées dans la gaine du psoas iliaque*). *Rev. de chir.* Par 1936 53 354

Most references to the occurrence of pus in the psoas sheath are to cases of secondary infections the pus originating in neighboring tissues and draining through the psoas sheath. In 1742 Mauquet de la Motte called attention to the relation of flexion on fracture of the thigh to abscess in the psoas sheath. In 1929 Pouce! advanced the theory that primary iliopsoas inflammation is only a reaction transferred from a neighboring adenitis. In 1934 Bolte furnished anatomic proof of this theory by describing definite lymph nodes in the vertebral insertion of the psoas muscle fibers.

According to Lombard the primary psoas infection may occur by way of either the blood stream or the lymph channels.

The iliac fascia which covers the iliopsoas muscle extends down to the lesser trochanter which explains involvement of the tissues of the thigh secondary to psoas infection. It is in intimate contact also with a close plexus of blood vessels and lymph channels which explains the ease with which it becomes infected.

The infection is usually on the right side possibly because appendicitis is frequently the original focus. Two aspects of the lesion are possible: a generalized swelling of the muscle without abscess formation or the definite collection of pus into pockets.

Children are more often affected than adults. The onset may be sudden but as a rule is insidious. The child limps a little, complains of pain and is unable to extend the hip completely. Soon the pain becomes so severe as to confine him to bed. A rather hard tender swelling can be felt between the vertebral column and the ilium. Neither the ilium nor the spine is tender. Pressure on the lesser trochanter is painful. There is a leukocytosis and the tempera-

ture may go as high as 40 degrees C. The pus may discharge into the peritoneal cavity with fatal results, or there may be a terrific hemorrhage due to ulceration through the wall of a blood vessel. The most frequent complication is acute arthritis of the hip joint.

The diseases which may simulate iliopsoas infection are acute arthritis of the hip, osteomyelitis in the region of the hip or in the vertebral column and acute retrocecal appendicitis.

Necrosis of the psoas muscle always occurs. There may be a hematoma from trauma preceding the infection. Sometimes a lesion of entry can be found on the leg or foot.

The benign forms may subside under treatment by extension of the leg and the application of hot fomentations to the tender area. The grave septicemic form which rarely suppurates will require general medical treatment. In cases in which abscess occurs drainage may be established by incision into the psoas sheath through an approach close to the ilium. The movements of the abdominal viscera aid in evacuation of the pus.

The prognosis is now more favorable than formerly because of more accurate diagnosis and better drainage.

WILLIAM ARTHUR CLARK, M.D.

Badgley, C. E., Iglesias, L., Perham, W. S. and Snyder, C. H. A Study of the End-Results in 113 Cases of Septic Iliis. *J. Bone & Joint Surg.*, 1936, 18, 1047.

One purpose of the study reported in this article was to determine the essential differences between streptococcal and staphylococcal infections of the hip joint. The authors present tables which indicate that the important factor is the localization of the primary infection. If the infection is primary in the synovial cavity, rapid healing with joint mobility and freedom from recurrence may be expected regardless of whether the infection is streptococcal or staphylococcal. Primary osteomyelitis followed by secondary joint invasion leads to complications such as delayed healing, draining sinuses and recurrence as long as the osteomyelitis remains active.

A frequent complication of pyarthrosis of the hip is dislocation. This occurred in 34 of the cases reviewed. It is generally due to flexion, adduction, and internal rotation of the leg when the capsule has become distended or ruptured. As a rule it can be prevented by traction with the leg extended and slightly abducted. When it occurs drainage from the joint may be improved but it is generally followed by sequestration or absorption of the femoral head and in at least half of the cases the functional end result is poor.

Sequestration of the femoral head occurred in 21 of the cases reviewed. In all but 4 it was preceded by dislocation or definite pathological changes in the head or neck, such as epiphysiolysis or osteomyelitis. The anterior or anterolateral approach to the joint is less liable to damage the blood supply of the head than arthrotomy performed by Ober's in-

cision. Of the 21 patients whose cases are reviewed, 4 died and 13 others had a marked or complete residual ankylosis.

In 43 of the reviewed cases the femoral head was eventually lost either by surgical removal or by spontaneous absorption. This occurred particularly in patients under six years of age after sequestration of the head or pathologic dislocation.

Fourteen of the 113 patients died. In the majority, healing occurred eventually, but only 7 had normal function. Twenty-three had a functional joint with normal motion of 50 per cent or more. Dislocation and epiphysiolysis can be prevented by early arthrotomy and fixation in abduction and extension. Arthrotomy is indicated for the drainage of pus or the eradication of an osteomyelitic focus. The age of the patient is important. In the cases of patients under two years of age the lesion is probably primary in the synovial cavity and the prognosis is good. The prognosis is good also in the cases of patients between two and five years of age if there is no bone infection. Between the ages of six and eighteen years osteomyelitis is common, complications develop, and the functional end result is apt to be poor.

CHESTER C. GUY, M.D.

Cella, G. The Importance of the Blood Vessels of the Round Ligament in the Growth of the Head of the Femur (*Sull'importanza dei vasi del legamento rotondo nel processo di accrescimento della testa femorale*). *Chir. d'organi di movimento*, 1936, 22, 1.

Cella states that a number of investigators have shown that the head of the femur receives its blood supply from 3 sources: (1) the diaphysis of the femur, (2) the epiphysis, and (3) the round ligament. With regard to the relative importance of each of these sources in the young and adult individual there is considerable difference of opinion.

Cella carried out a series of experiments on cats, rabbits, and dogs of various ages. In the cats and rabbits he dislocated the head of one femur anteriorly by flexing, adducting and externally rotating the thigh until the round ligament was torn and then replaced the head of the femur in the joint cavity by reversing these movements. In the dogs he severed the round ligament surgically. The animals were killed from 5 to 135 days after the operation.

In the animals which were operated on one day after birth, i.e., prior to the formation of a center of ossification, there were no macroscopic changes in the shape or size of the head of the femur, but microscopic examination at the site of insertion of the round ligament revealed an area in which the cells stained poorly and their nuclei were small and shrunken.

In the animals which were operated on ten days after birth there were no macroscopic changes, but microscopic examination showed the area of insertion of the round ligament to be markedly ischemic and that each cell in this region had a small nucleus and a granular cytoplasm. In some places the tissue



seemed to be replaced by an homogeneous mass. The centers of ossification appeared normal.

In the animals which were operated on forty days after birth and examined five months after birth and in old animals there were no macroscopic or microscopic findings.

From these observations the author draws the following conclusions:

1 The blood supply of the round ligament in young animals prior to the formation of an ossification center in the head of the femur contributes to but is not indispensable for the nutrition of an osseous area which corresponds to the site of attachment of the round ligament to the head of the femur.

2 This blood supply decreases in importance rapidly with advancing age so that by the time of the formation of the ossification center its suppression gives rise to no changes in the head of the femur or at the site of insertion of the round ligament.

3 The blood supply derived from the round ligament has no importance whatever in the development of the ossification center of the head of the femur. The blood supply of this center is derived mainly from the posterior circumflex artery of the thigh.

RICHARD F. SOMMA, M.D.

**Logroscino D.** The Round Ligament and Its Arteries in the Pathology of the Epiphysis of the Femur. (Il legamento rotondo e le sue arterie nella patologia dell'epifisi femorale). *Chir. d. organi d. movimento* 1910 22 111.

In studying the blood supply of the round ligament in embryos 200 mm. long the author found that in the region of this ligament there are 2 main arterial vessels which originate from the acetabular branch of the obturator artery and subdivide into fine branches which are distributed in a fan-like arrangement to the superior pole of the epiphysis. These arteries are very important for the nutrition of the epiphysis of the femur but are less important than the arteries derived from the metaphysis. There are numerous delicate anastomoses between the arteries of the round ligament and those of the supero-external and infero-medial tracts of the epiphysis which are derived from the synovial vessels of the metaphysis.

These vascular conditions prevail up to the ninth month of pregnancy. In the full term infant the round ligament has the form of a somewhat flattened cord and is about 8 mm. long.

In discussing the pathologic changes and the clinical aspects of conditions involving the epiphysis of the femur the author first takes up subcapital fractures of the epiphysis. He states that in cases of complete interruption of the vessels of metaphyseal origin the epiphysis derives its nourishment only from the arteries of the round ligament and therefore, depending upon the anatomic and functional integrity of these vessels either an aseptic necrosis of the epiphysis results or by secondary revascularization a callus is formed and union of the fragments occurs.

In traumatic detachments of the epiphysis the mechanical and biological conditions are similar to those in subcapital fractures of the femur but these lesions are observed in individuals of different age groups. The ultimate outcome depends upon the conservation of the blood supply. If all of the arteries are destroyed by the trauma necrosis of the epiphysis is inevitable.

In cases of idiopathic detachment of the proximal epiphysis of the femur the findings of recent investigations and of autopsies have led to the consideration of such factors as trauma, static forces in growing individuals, endocrine disturbances and vascular lesions of the arteries of the round ligament in individuals with vasomotor disturbances as possible causes.

Dislocations of the hip joint are subdivided by the author into (1) traumatic dislocations in which laceration of the round ligament is often inevitable, (2) congenital dislocations in which the round ligament is gradually flattened without impairment of its anatomical integrity but with a consequent change in its shape in adult life, and (3) paralytic dislocations, which are often observed in association with various types of paralysis especially poliomyelitis.

Logroscino next discusses cases of epiphyseitis caused by tuberculous, staphylococcal and streptococcal infections and those syndromes which are due to internal incarceration and laceration of the round ligament. In the latter the most characteristic symptoms are (1) pain due to compression of the nerves of the ligament derived from the obturator and femoral nerves, (2) local swelling and reflex rigidity due to an intra-articular transudate caused by the interruption of the blood stream, (3) elevation of the temperature due to shock and absorption of the transudate, and (4) trophic disturbances of the epiphysis due to sudden interruption of the intraligamentous blood supply.

RICHARD E. SOMMA, M.D.

**King D.** The Function of the Semilunar Cartilages. *J. Bone & Joint Surg.* 1936 18 1069.

In a series of experiments on dogs knees the internal or external semilunar cartilages were partially or completely excised and the condition of the joints determined three or four months later. It was found that partial or complete extirpation of the internal meniscus was followed by replacement by new tissue resembling hyaline cartilage which grew from the synovial membrane. In spite of this replacement the examination revealed roughening and degeneration of the articular hyaline cartilage proportional to the amount of cartilage excised. Excision of the external meniscus was also followed by this degeneration but not by false cartilage formation. The author concluded that the function of the semilunar menisci is to protect the articular hyaline cartilage and that probably excision of only the mobile portions is advisable.

CHESTER C. GUY, M.D.

Iindblad, M. Local Growth Disturbances in Tuberculous Disease of the Knee Joint in Children. *Acta radiol.*, 1936, 17 359

In 11 cases of tuberculous gonitis in children ranging in age from 3 to 8 years the author noted besides the classical signs of the disease—which in early cases consist merely in capsular changes and diffuse atrophy of varying degree—an increase in the length of the femur on the diseased side. The average difference in the length of the 2 femurs in the total number of cases was 8.5 mm. In 9 cases the tibia on the diseased side was also increased in length. The average difference between the 2 tibiae was 3.8 mm.

From the situation of the 'growth lines' the author concludes that the acceleration of growth must have been localized almost entirely to the growth centers about the diseased joint.

In all of the 11 cases a straightening out of the angle of the collum on the diseased side was observed. The widening averaged about 12 degrees.

The epiphyseal centers about the diseased joint were found enlarged to a varying degree. There was observed not only an increase in size with maintenance of the same shape but also a varying degree of differentiation into a more advanced form on the diseased side.

In 2 of the cases there was retardation of growth at a more advanced stage of the disease.

### SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC

Bonola, A. Physiological Principles of Tendon Transplantation in the Treatment of Permanent Musculospiral Paralysis. (Indirizzo fisiologico del trapianto tendineo nella terapia delle paralisi inveterate del radiale.) *Chir. d'organi di movimento*, 1936, 22 239.

Bonola presents a critical historical review of the various techniques for tendon transplantation in musculospiral paralysis with formulas and diagrams and a table showing the excursion and work capacity of the muscles of the forearm and hand. He then reports 3 cases of irremediable musculospiral paralysis which were operated on at the Rizzoli Institute at Bologna. The palmaris longus and brevis or the longus alone was substituted for the extensors and long abductors of the thumb, and the flexor carpi ulnaris for the common extensors of the fingers. The permanent results in all of the cases were excellent.

The arrangement of choice in these transplantations is always that in which the tendon will have the shortest course and undergo the least angulation. Methods which with the purpose of maximal restoration of extension to the wrist and fingers, superimpose various strata of transplants are inadvisable because of the risk of adhesions. For reasons of both co-ordination and function, the action of an antagonist should not be spread over too many paralyzed tendons.

In the choice of antagonists it is necessary to take into consideration for each transplant its work capacity in comparison with that of the muscle which it is to replace, its contraction curve in connection with its new function, the distance and course to its new insertion, and the static equilibrium of the band in the lateral and flexion-extension planes. For work capacity, the optimum is approximation of the normal flexor extensor relationship of 3 to 1, but in practice, especially in the restoration of extension of the fingers, this is very difficult. However, the author knows from experience that good results can be obtained even with a flexor extensor relationship of 7 to 1.

For each muscle or group of muscles paralyzed there is an optimum transplant. For the extensors and abductors of the thumb, this is composed of the palmaris longus, and for the extensors of the fingers, of the flexor carpi ulnaris. Extension of the wrist is restored by transplants combined with shortening of the extensors and their tendons.

In view of numerous proofs that transplantation of antagonists may result in almost complete functional restoration of the hand, this method should be used for the great majority of irremediable musculospiral paralysis. The technique should be simplified to the extreme and the choice of antagonists varied according to the individual case. The operation should be reduced to substitution only for the muscles indispensable to good functioning of the hand (i.e., the extensors of the fingers and the abductor extensors of the thumb), without impoverishing the flexor group too much. It should be preceded by physical therapy to correct the retraction of the flexor tendons and rigidity of the wrist, and the transplant should be mobilized early.

The article is accompanied by photographs and a bibliography. M. E. MORSE, M.D.

Mandl, F. The Prophylaxis and Therapy of Post-operative Knee-Joint Infection. *Wien klin Wchnschr.*, 1936, 1 577.

In 600 cases in which the author performed a meniscus operation there remained no complications which in any way impaired the functional result. However, among cases of knee joint disease in which the primary operation was performed before the patient came under his observation there were 3 with postoperative complications. In 1, the complication was the presence of free joint mice with chondromalacia; in another, rupture of the crucial ligament with "irritation knee" which persisted for eight months, and in the third, ankylosis following a crucial and lateral ligament plastic operation. The result was poorest in the last case. The danger of infection of the knee joint must be considered from the viewpoint of the following facts and factors:

1. In the presence of a good outflow of lymph and blood, the possibilities of spread of the infection are increased.

2. The extensive synovial membrane is an excellent culture medium for bacteria.

3 The normal resistance of the knee joint to infection

4 The possibility of localization of an infection by the borders of the crucial ligaments

From these considerations the author concludes that local treatment is of great importance

In operations on the knee joint strict asepsis is necessary. The incision is also of importance as the danger of infection increases with the time required for the operation and the extent of the tissue trauma. The incision of choice is the simple parapatellar incision with preservation of the muscles and lateral ligaments.

For timely recognition of a postoperative infection a bacteriologic study of any exudate that may be present is necessary. Constant observation of the blood picture is of great importance as the blood findings may suggest the presence of a septic process. The author does not differentiate between the so-called joint empyema and capsular phlegmon.

The treatment indicated for postoperative infections of the knee joint includes immobilization, aspiration, the injection of various antiseptics, drainage according to the method of Payr and, in severe cases, parapatellar incisions followed by movement according to the method of Wilms or possibly, amputation. All other operative measures usually interfere with joint function and sometimes are followed by ankylosis. Whether and when to amputate is very difficult to decide.

The author briefly discusses the so-called irritation knee. This is essentially an inflammatory process following an open wound or an operative procedure on the joint. It is characterized by pain, redness, a slight increase in the temperature, and recurrent joint effusion. Slight infection may be present. As treatment Mandl recommends rest and the application of moist dressings.

(HAAGEN) WILLIAM C BELA, M.D.

### FRACTURES AND DISLOCATIONS

Perkins G and Watson Jones R. Fractures in the Region of the Shoulder Joint. *Proc Roy Soc Med Lond* 1930 29 1035

PERKINS discusses the importance of treating the soft parts along with rather than after a bone injury. He feels this is especially important in shoulder injuries in which the treatment of the soft parts is of far greater importance than the treatment of the bone. He is of the opinion that in fractures close to the shoulder joint splinting is unnecessary either to immobilize the fragments or to keep them in good position. The musculature is adequate for the first purpose and malalignment of the upper end of the humerus gives rise to no great disability. In his opinion the most satisfactory treatment for shoulder joint fractures is support with a sling and immediate treatment by a masseuse, with early active motion. He is strongly opposed to immobilization in an abduction splint.

WATSON JONES analyzes 571 cases of injury of the upper end of the humerus which were treated

at the Liverpool Royal Infirmary in the period from 1929 to 1934. He states that isolated fractures of the great tuberosity without displacement are best treated by sling and active motion. In cases with displacement, the arm must be immobilized in abduction of 90 degrees and external rotation of at least 60 degrees until the patient can actively lift it from the support. Dislocations of the shoulder should never be treated by passive motion. If the dislocation is associated with avulsion of the supraspinatus the arm should be put in an abduction frame as soon as the diagnosis is made, which is usually 5 or 6 weeks after the dislocation.

Fractures of the neck of the humerus may be divided into 3 groups: contusion crack fractures with no displacement; adduction fractures, and abduction fractures. Contusion crack fractures with no displacement should be treated by sling and active motion. Adduction fractures should be immobilized with the arm in abduction of 90 degrees. Abduction fractures frequently show little displacement and may be treated with a sling. If there is no impaction reduction is necessary but never abduction. Occasionally fracture dislocations may be reduced by manipulation but frequently they require open operation. BARBARA B. SIMMON, M.D.

Welcker E R. Fractures of the Tuberosities of the Humerus (Ueber Frakturen der Tubercula humeri). *Arch f klin Chir* 1930 184 623

Welcker reports in detail a case of bilateral isolated fracture of the lesser tuberosity of the humerus observed at the Greifswald Clinic, an injury which has not been previously described in the literature. In contrast to the isolated fracture of the greater tuberosity, the isolated fracture of the lesser tuberosity is an indirect fracture caused by a tear of the subscapularis muscle due to stretching. Welcker discusses the mechanics of its production in detail. In the reported case of bilateral fracture of the lesser tuberosity bilateral axillary nerve damage occurred. On anatomic grounds, the axillary nerve damage is to be considered a typical complication of fracture of the lesser tuberosity. In contrast to the pressure damage of the nerve in dislocation of the shoulder, the axillary nerve injury due to stretching of the subscapularis muscle is a tearing injury.

The author reports also on the fractures of the greater tuberosity which have been observed in the Greifswald Clinic in the last ten years. Such a fracture occurred in 12.9 per cent of 155 cases of shoulder dislocation. In the cases treated from the beginning at the Greifswald Clinic the results were considerably better than those in the cases which were first treated elsewhere. The poor results in the latter were due chiefly to failure to recognize the complicating injury early.

The prognosis of isolated fracture of the greater tuberosity is favorable. As a rule such fractures are produced by indirect violence. Occasionally, however, they may be the result of both direct and indirect force.

In discussing the symptoms and diagnosis the author calls attention to a sign not recognized heretofore which permits a probable diagnosis of injury of the greater tuberosity, viz., the impossibility of active outward rotation and severe pain on attempts at passive outward rotation with surprisingly free and almost painless inward rotation.

As treatment he recommends active motion as soon as possible.

Typical roentgenograms of the various types of injuries are presented.

(WELCKER) BARBARA B. STIMSON, M.D.

Guazzieri G. Bennett's Fracture (Sulla frattura di Bennett) *Riv. di chir.*, 1936 2 292

In 1882 Bennett described a fracture involving the base of the first metacarpal bone. This fracture occurs most frequently in persons engaged in heavy manual labor and in boxers. It is caused usually by a blow or fall on the head of the metacarpal bone while the thumb is in flexion. In rare instances it is produced by a pulling force. From experimental studies which he carried out to determine the mechanism of its production the author draws the following conclusions:

1. Bennett's fracture may be produced experimentally by a crushing blow imparted, for example, with a hammer of medium size on the head of the first metacarpal bone while the hand is solidly supported on the ulnar side and its base is violently thrown against the inferior articular surface of the greater multangular bone.

2. The force must be considerable because the metacarpal bone offers resistance before it fractures.

3. The best position in which to produce the fracture is abduction and medial extension of the metacarpal bone.

4. It is possible to produce Bennett's fracture always by the same mechanism even if, between the point where the trauma is inflicted and the base of the metacarpal bone, there is an intermediate articulation, provided, however, that the latter is well fixed and the thumb is on the line of abduction and slight extension in which the metacarpal bone has been placed. In this manner it has been possible to produce Bennett's fracture with a blow of the hammer on the tip of the thumb of a cadaver of middle age.

It is impossible to produce Bennett's fracture experimentally by pulling forces, by bringing the metacarpal bone into abduction and forced extension.

Bennett and others regarded osseous crepitation as of considerable importance in the differential diagnosis but the author believes that this is not at all constant.

Another symptom is pain localized at the base of the anatomical snuff box. As a rule the fracture is easily differentiated from other fractures and dislocations in the same region. The clinical findings should always be controlled with roentgenograms.

The treatment should consist in immobilization and continuous traction maintained for from two to three weeks.

RICHARD E. SOMMA, M.D.

Goetze, O. Safeguarding the Restoration and Reconstruction of the Roof of the Acetabulum (Die Sicherung der Restauration und Rekonstruktion des Hueltpfannendaches) 60 Tag d. deutsch. Ges. f. Chir., Berlin, 1936.

Follow up examinations of patients with congenital dislocation of the hip reduced successfully by conservative methods have revealed an unexpectedly high percentage of poor end results. Well known are the findings of the investigation which Lange reported at the German Orthopedic Congress in 1929. Similar disappointing results were found by Beck in follow up examinations of patients treated at the Erlangen Clinic. In only one eighth of the cases in which reduction was effected 5, 10, or 20 years previously did the roentgenograms show an anatomic cure. In the others it revealed disappearance of the roof of the acetabulum with subluxation which at first was slight but with increasing age became more pronounced or resulted in complete relaxation. Deformities of the head of the femur of all grades and arthrosis deformans were also found to increase with the duration of the period of observation. Of great importance is the fact that considerable anatomic malformations may not cause symptoms for years although they ultimately produce marked symptoms. In studies of patients treated at Bier's clinic, Beck found that even in those with a perfect anatomic cure the acetabulum may become flattened and subluxation with pronounced symptoms may occur during adolescence.

Even in the absence of a manifest congenital dislocation of the hip or the reduction of such a dislocation a flat acetabulum with an insufficient roof and anatomic and functional disturbances may be found in patients who, up to their fifteenth, twentieth or twenty fifth year of age were completely or almost completely free from symptoms and had no indication of hip disease during childhood. In such cases of vague hip disorders in adults, Fischer of the Erlangen clinic found malformations of the acetabulum surprisingly often. He described and analyzed in detail the lesser grades of flat acetabulum which previously has received little recognition.

These 2 series of observations show the great importance of the roof of the acetabulum, without which it is apparently impossible to obtain permanent asymptomatic function of the hip joint by either early conservative or operative treatment of congenital dislocation. In conservative treatment it was hoped, by early reduction, if possible before the end of the first year of life, and by long continued after treatment, to improve the poor results considerably. Because of the frequent failure of conservative measures, plastic operations on the roof of the acetabulum are being performed more and more often. Without doubt these efforts will

lead to considerable improvement of the end results. Such improvement is already evident for example, in the work of Schede.

Modern orthopedic endeavors therefore require, on the one hand early diagnosis and, on the other, especially in neglected cases and those treated too late or unsuccessfully, certain formative powers of the body: (1) the power of functional adaptation which will respond to the stimulus of weight bearing and movement with the formation of an acetabular roof capable of bearing weight and (2) a reparative power following operative reconstruction of the roof of the acetabulum.

Under the conditions mentioned it may be allowable to subject the lesion and the treatment to a critical discussion based upon embryological laws and the information gained from general surgery.

What normal powers form the hip joint ontogenetically? Normally, the hip joint and the roof of the acetabulum are formed without participation of the functional stimuli of the body and its environment, therefore entirely by entelechy, the primary self-shaping energy of the developing organism. In embryological life all of the tissues are so sensitive and vulnerable that mechanical influences which in later life act as functional stimuli may injure them severely (Jansen and Debrunner). After termination of the period of growth from the eighteenth to the twentieth years of life the formative powers of the body are controlled entirely by functional stimuli. Before then that is throughout the period of growth the action of these stimuli is combined with that of the non-functional differentiating energies of the body. During the first decades of life the latter gradually decrease.

Congenital dislocation therefore goes back to a primary defective anlage, an arrest of development which perhaps even in favorable cases is responsible for an at least latent inferiority throughout life. The hip never becomes able to meet the demands of the upright position under all conditions. However, the defect is pathologic chiefly in the sense of retardation. There may be also cases in which the automatic formative power remains permanently entirely insufficient or permanently misdirected. The subsequent course of development in cases of reduced dislocation shows clearly that a normally directed though retarded purposive tendency in the development of the roof of the acetabulum is always evident. The retardation may be explained by the assumption that after birth the child retains for a longer or shorter period of time the peculiar and dangerous properties of the embryonic tissue with deficient power of resistance in its cartilaginous and bony pelvis to normal functional stimuli.

The author suggests that in the treatment of congenital dislocation of the hip an attempt be made to utilize this primary automatic formative energy which is essentially independent of function and to a certain extent may at first be disturbed by functional stimuli. He believes it possible that the therapeutic problem may be solved by direct stimu-

lation of this primary power of automatic differentiation (hormones and vitamins). He regards it as certain at any rate that the great sensitivity of the embryonic hip must be given considerably more consideration than it has received heretofore and that all stimuli of weight bearing and movement should be excluded as completely as possible. The fact that relaxation can occur even when a plaster cast is applied correctly proves that a plaster cast does assure absolute immobilization. The frequent subsequent flattening of acetabulum shows that the formative functional balance is always disturbed by hyperfunction and demonstrates the surprisingly slight power of resistance of the roof of the acetabulum.

If it is desired to prolong the period of automatic formation and the reciprocal differentiation of the head of the femur and the acetabulum artificially, this can be done only by complete elimination of all so-called functional stimuli and harmful influences. When the head of the femur cannot be replaced deeply by conservative means the hip joint should be opened with care to prevent injury to the blood vessels entering behind the neck of the femur and supplying the head of the acetabulum. The acetabulum made capable of accommodating the head by careful and conservative removal of cartilaginous and connective tissue obstructions and the head of the femur then reinserted and fixed in such a way that the roof of the acetabulum can grow around it spontaneously without disturbance. In order that the hollow spherical shape of the primarily cartilaginous acetabulum may be formed perfectly, gliding movements of the femur from below upward must be prevented during the early weeks or months after the reposition. If in the decisive early weeks after the reposition the cartilaginous acetabulum which unfortunately cannot be visualized in the roentgenogram assumes an oval form all of the prerequisites for sliding and thrust trauma of the re-generating acetabulum are provided by the slight gliding movements which can occur even under a plaster cast.

Goetze obtains firm fixation with the aid of a blunt pointed nail which he introduces through the trochanter, the neck and head of the femur and the acetabulum as far as the interior of the pelvis. This prevents dangerous sliding movements even without the use of a plaster cast, yet allows limited flexion and extension (ball and socket movements).

There are of course objections to this perforating nail, but on the basis of the findings in articular surfaces following arthrodesis with thick perforating bone splinters, the tendency toward permanent injury of the cartilage of the head of the femur as a whole may be estimated as being in general slight. However, the dislocated head with its lowered resistance may react differently. Under such conditions the nail must surround it. From the end results in replaced congenitally dislocated hips we know that when the roof of the acetabulum is good the tendency toward deformity of the head of the

femur is generally slight. Another danger is that of stiffness which increases with advancing years. Nevertheless, in the case of a girl 7 years of age who carried a nail for 4 months, this was relieved in a short time. Five months after the head of the femur was replaced deeply in the acetabulum small bone shadows became visible in the region of the future roof of the acetabulum and today, about 11 months after the reduction, the bony roof of the acetabulum has developed to such an extent that the hope of an entirely normal form seems justified.

In conclusion the author states that subjective freedom from symptoms must never deceive us as to the threatening dangers. We should not await symptoms but should be always on the alert to determine, by means of roentgenography, whether the prerequisites for the development of an anatomically normal hip joint are present. If this is not the case, energetic conservative or operative measures are indicated as all types of malformations denote a predisposition to the development of symptoms ultimately.

The retention aid described is applicable also in the most varied types of plastic operations on the roof of the acetabulum. In these, the nail may be of value to relieve the weight on the plastically introduced roof material during the time of bony consolidation and also to overcome the tendency toward subluxation of the head in the depth of the acetabulum. The author has used it several times in operations for congenital dislocation of the hip in older children and adults but is not yet ready to report its results in such cases.

(GOSZKA) LOUIS NEUWEIT, M.D.

**Campbell W. C. Posterior Dislocation of the Hip with Fracture of the Acetabulum.** *J. Bone & Joint Surg.*, 1936, 18: 841.

Of 80 cases of posterior dislocation of the hip, a complicating fracture of the acetabulum was present in 30. Sixteen of the latter were recent cases and 14 were old. Campbell recognizes 3 types of such cases.

**Type 1.** In this type there is a fracture in the superoposterior aspect of the acetabulum of an irregular, more or less triangular piece of bone. The head of the femur is subluxated slightly upward and backward. Stereoscopic roentgenograms are essential to determine the exact location of the head. The deformity is not great. The subluxation is frequently unrecognized, distressing disability therefore resulting.

**Type 2.** The head of the femur is further displaced and the fragment from the acetabulum is pushed up a considerable distance. The deformity and disability are marked.

**Type 3.** In this type there is a complete dislocation of the head and the accompanying acetabular fragment with typical signs and symptoms.

In Types 2 and 3 the diagnosis should be obvious. The mechanism of injury is usually force applied from below with the hip flexed, as in a automobile collision when the knee strikes against the instrument board. The treatment in fresh cases is immediate reduction followed by immobilization in plaster with the hip in slight hyperextension and abduction. Active and passive motion are started in the bivalved cast at the end of three weeks and walking with crutches at the end of six weeks. Walking without support is begun at the end of ten or twelve weeks.

Of the 16 fresh cases reviewed, 6 were of Type 1, 6 of Type 2, and 4 of Type 3. Open reduction was done in 3 cases. Of the 13 other cases, excellent results were obtained in 6. In 1 case the result was poor, and in 2 cases the treatment was given too recently for the result to be known. Four patients cannot be traced. Of the 14 cases with old dislocations, open operation was done in 8. Three types of operations were performed: (1) open reduction with reconstruction of the acetabulum, (2) partial arthroplasty, and (3) complete arthroplasty. The end results were far from satisfactory. In all these cases fusion was recommended but refused.

Illustrative roentgenograms accompany the article.

BARBARA B. STIMSON, M.D.

lead to considerable improvement of the end results. Such improvement is already evident for example, in the work of Schede.

Modern orthopedic endeavors therefore require, on the one hand early diagnosis and on the other, especially in neglected cases and those treated too late or unsuccessfully certain formative powers of the body. (1) the power of functional adaptation which will respond to the stimulus of weight bearing and movement with the formation of an acetabular roof capable of bearing weight and (2) a reparative power following operative reconstruction of the roof of the acetabulum.

Under the conditions mentioned it may be allowable to subject the lesion and the treatment to a critical discussion based upon embryological laws and the information gained from general surgery.

What normal powers form the hip joint ontogenetically? Normally the hip joint and the roof of the acetabulum are formed without participation of the functional stimuli of the body and its environment therefore entirely by *entelechy*, the primary self-shaping energy of the developing organism. In embryological life all of the tissues are so sensitive and vulnerable that mechanical influences which in later life act as functional stimuli may injure them severely (Jansen and Debrunner). After termination of the period of growth from the eighteenth to the twentieth years of life the formative powers of the body are controlled entirely by functional stimuli. Before then that is throughout the period of growth the action of these stimuli is combined with that of the non-functional differentiating energies of the body. During the first decades of life the latter gradually decrease.

Congenital dislocation therefore goes back to a primary defective anlage, an arrest of development which perhaps even in favorable cases is responsible for an at least latent inferiority throughout life. The hip never becomes able to meet the demands of the upright position under all conditions. However the defect is pathologic chiefly in the sense of retardation. There may be also cases in which the automatic formative power remains permanently entirely insufficient or permanently misdirected. The subsequent course of development in cases of reduced dislocation shows clearly that a normally directed though retarded purposive tendency in the development of the roof of the acetabulum is always evident. The retardation may be explained by the assumption that, after birth the child remains for a longer or shorter period of time the peculiar and dangerous properties of the embryonic tissue with deficient power of resistance in its cartilaginous and bony pelvis to normal functional stimuli.

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lation of this primary power of automatic differentiation (hormones and vitamins). He regards it as certain, at any rate that the great sensitivity of the embryonic hip must be given considerably more consideration than it has received heretofore and that all stimuli of weight bearing and movement should be excluded as completely as possible. The fact that refutation can occur even when a plaster cast is applied correctly proves that a plaster cast does assure absolute immobilization. The frequent subsequent flattening of acetabulum shows that the formative functional balance is always disturbed by hyperfunction, and demonstrates the surprisingly slight power of resistance of the roof of the acetabulum.

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portal vein. Serial transverse sections through the hepatoduodenal ligament upward to the hilus of the liver demonstrated that the portal vein was replaced by a few small channels up to 3 mm in diameter.

Acute complete thrombosis of the portal vein usually progresses rapidly to a fatal termination from infarction of the small intestine. Chronic occlusion of the portal vein runs a much longer course, up to twenty years or more. The changes in the portal vein range from transformation into an impervious fibrous cord, often with calcification, to replacement by an angiomatous or cavernous mass the size of a goose egg.

Simonds discusses chronic occlusion of the portal vein on the basis of the case he reports and 94 cases which he collected from the literature. He states that the condition is about twice as frequent in men as in women. The most common symptoms and physical signs are ascites, abdominal pain, hematemesis, and a palpable spleen. The chief causes of death are hemorrhage and infarction of the intestines.

Since the work of Cobnheim and of Welch, alterations in the composition of the blood, slowing of the blood flow, and injury of the lining of the vessel have been accepted as the fundamental factors in the causation of thrombosis in general. In thrombosis of the portal vein these factors play a part in several ways. In at least 4 of the cases reviewed polycythemia was present. Kratzenstein and Gruber expressed the opinion that increased viscosity of the blood associated with polycythemia may be a factor in thrombosis. Changes in the blood flow may result from intrahepatic obstruction, mechanical pressure from enlarged lymph glands, and carcinoma of the head of the pancreas. Syphilis is considered an important etiologic factor in thrombosis of the portal vein. The syphilitic lesion of the vein may be degenerative and affect the media, or may be exudative and involve the other coats of the vein. Numerous secondary changes in the portal vein that may influence thrombosis are chiefly the results of infection, but trauma is apparently a causative agent in some cases. The frequency with which appendicitis leads to thrombosis of the portal vein is emphasized. Puerperal and other infections of the female genital tract have been regarded as etiologic factors. In the case reported by the author the patient had an abortion and an operation for pyosalpinx eight years prior to death and six years before the onset of symptoms. Simonds believes that the extension of an inflammatory or neoplastic process to the portal vein from surrounding structures is a factor in many cases.

On the basis of the nature of the lesion in the portal vein he divides the reviewed cases into 2 groups. In one group the vein was reduced to a fibrous cord with relatively slight canalization. In the other, it had been replaced by an elongated mass of spongy, cavernous tissue in which traces of the wall of the vein were usually, though not always,

discernible. The majority of those who have studied this condition believe that it is merely the result of organization of a thrombus with marked recanalization. Others consider the lesion a congenital malformation. Pick expressed the opinion that the condition is a neoplasm—an angioma or cavernoma of the hepatoduodenal ligament.

The most constant accompaniment of chronic occlusion or stenosis of the portal vein is enlargement of the spleen. Changes in the liver are not so extensive or so frequent as might be supposed.

In 5 of the reviewed cases splenectomy was performed. One of the patients subjected to this operation survived for seven years. The infrequency with which the spleen is removed in this condition is surprising as splenectomy would seem to be the logical treatment. It reduces the burden on the collateral circulation usually by about one fifth, and when the spleen is greatly enlarged, probably more. When the collateral circulation has become so incompetent that rapidly increasing ascites develops or when the esophageal varices have become so large as to be the source of frequent and copious hemorrhage the patient will survive for a period of from only a few months to two or three years.

HERBERT F. THURSTON, M.D.

Tomasi, L. A Contribution to the Pathology and Clinical Features of Thrombophlebitis of the Upper Extremity (*Contributo alla patologia e alla clinica delle tromboflebiti dell'arto superiore*). *Arch. ital. di chir.*, 1936 43 525.

After briefly reviewing the factors which are thought to play a role in the development of thrombophlebitis of the upper extremity, the author reports a case in which a thorough pathological study of the amputated arm was made and autopsy was performed. The patient was a male farmer forty-five years of age who entered the clinic December 27, 1934. In 1918 he had had an attack of influenza associated with a gastro-intestinal disturbance which persisted for some time. For about one year he complained of a heavy sensation in the left hypochondrium which was thought by his physician to be related to enlargement of the spleen. Slightly more than one month before his admission to the clinic he noted a more or less sharp pain in the left flank and lower thorax on the left side which was exaggerated by breathing and coughing. There was no fever. The condition cleared up within a few days. Shortly afterward he suffered an abrasion of the right hand which healed promptly. About one week before his admission to the clinic he noted a series of vague symptoms to which he at first paid little attention. There was no history of trauma or undue force at any time. In the beginning there was an indefinite sense of difficulty in the left arm followed soon by indefinite pain localized in the upper part of that arm. This sensation extended gradually to the subclavicular, the upper pectoral, and lower cervical regions. The entire upper extremity then felt so heavy that it could not be used



as well as formerly. Although there was no fever a slight generalized weakness developed. During the next two or three days the pain not only became so severe in the original site that it forced the patient to stop work, but extended to the entire left extremity. At this time some swelling and change in color of the extremity were noted. The symptoms then became more rapidly progressive with the development of diffuse swelling of the entire extremity to the point where the skin was tight translucent and somewhat cyanotic especially in the distal portions. The sensibility of the entire extremity gradually decreased.

On physical examination when the patient entered the clinic the arm was found abducted about 45 degrees, the elbow semiflexed, the hand prone, and the fingers flexed. The size of the extremity was increased by a diffuse swelling of cylinder like proportion. The circumference of the extremity was uniformly about 3 or 4 cm greater than that of the opposite normal extremity. The swelling extended to the base of the neck and the clavicular pectoral and upper scapular regions. The skin was tense translucent edematous and decidedly cyanotic. The peripheral temperature was found to be moderately decreased. The radial pulse was easily perceptible.

A diagnosis of probable spontaneous primary lesion of the large vein of the upper extremity was made and the patient put to bed. For about seven days there was no change in the general or local condition. Then began a gradual decline with fever increased respirations, deepening of the local cyanosis, diminution of the arterial pulse, loss of sensibility of the extremity, bullae formation and evidence of necrosis. Because of the progressive nature of the lesion disarticulation of the shoulder was performed on the twelfth day. Two weeks later the patient died of multiple pulmonary emboli.

Pathologic examination of the amputated upper extremity revealed all the evidences of gangrene, which were most marked distally and gradually decreased toward the proximal regions. The arteries appeared normal. The changes were most definite in the veins both superficial and deep. The entire brachial and lower axillary veins and their branches, both deep and superficial, were occluded by a continuous thrombus. There was a massive occlusion of the entire venous system of the entire upper extremity. A diffuse lymphocytic infiltration of all the tissues was noted. In sections of the thrombi and tissues especially stained for bacteria numerous staphylococci and diplococci were seen.

The author describes the findings at autopsy in detail. Of most importance were thrombosis of the inferior vena cava and its branches, pulmonary embolism, and empyema.

On the basis of the findings in this case he attempts to clarify some of the many problems associated with the condition. He states that gangrene of purely venous origin is uncommon.

A. LOUIS ROSE, M.D.

## BLOOD, TRANSFUSION

Hesse E. The Nature and Treatment of Hemolytic Shock After Blood Transfusion in the Light of Experimental and Clinical Investigation (Ueber das Wesen und die Behandlung des haemolytischen Shocks nach Bluttransfusion im Lichte experimenteller und klinischer Forschung) *Zeitschrift für Chirurgie* 1936 163 390

Bogomolatz Bajdasarov Vlados and others do not recognize hemolytic shock as a distinct entity but classify all complications following blood transfusion as colloidoclasia. Hesse and his school subdivide such complications into 4 groups: (1) non-specific protein reactions of varying intensity, (2) hemolytic shock and its sequelae, (3) intoxication of the organism by denatured proteins occurring in preserved blood and (4) anaphylactic shock.

Hemolytic shock still holds first place despite the great increase in knowledge regarding its agglutination. By means of experiments Hesse was able to prove that hemolysis of the erythrocytes liberates depressor substances which act directly on the walls of the blood vessels. Sequelae of the action of these substances are vessel spasms, dilatation of the capillary network, vascular engorgement, and a fall in the blood pressure. The second phase is brought about by spasm of the renal arteries. The toxic products liberated from the erythrocytes cause disturbances of kidney function.

Altogether 217 cases of hemolytic shock have been recognized: 60 in Germany, 59 in Russia, and 38 in North America. The actual number is probably much greater. Hesse observed the occurrence of hemolytic shock in 6 (34 per cent) of 2360 transfusions. The final result was recorded in only 100 cases. In the latter there were 105 deaths, a mortality of 52.5 per cent. However in 16 cases the treatment was that recommended by Filatov. If these are subtracted the mortality was 56 per cent. The cause of hemolytic shock is generally a difference in the blood groups. Schiff believes that a mistake in the blood grouping is always the cause. However there are exceptional cases in which it occurs when the blood groups are alike.

Hesse considers donors of Group O as belonging to a dissimilar blood group. In 46 cases in which a universal donor was used there were 20 deaths from shock. Hemolytic shock developed readily when quantities exceeding 500 c.c. were transfused when there was severe anemia (an erythrocyte count less than 2 million) and when the titer of the donor's serum to the erythrocytes of the recipient was high (above 1:32). Of the cases of patients belonging to Group A the titer was high in 42.3 per cent and of those of patients belonging to Group B it was high in 32.7 per cent.

Shock may occur also when the plasma is dissimilar although there is a universal plasma (AB). Theoretically failure to recognize subdivisions A<sub>1</sub> and A<sub>2</sub> may result in shock, but in practice this is of little importance. In the use of preserved blood hemolysis may occur: (1) if the blood has been

preserved for a long time, (2) if it is heated to from 42 to 44 degrees, and (3) if denatured proteins are formed. Under such conditions amaurosis and severe disturbances of consciousness result. So far, hemolytic shock has occurred in 20 cases in which preserved blood was used. In 10, the blood was incompatible, and in the other 10 the condition of the blood was at fault.

Hesse differentiates 3 forms of hemolytic shock. The first is the acute form with mild vascular and cardiac phenomena which soon disappear. In this form about 50 c. cm. of hemolyzed blood can be taken care of by the reticulo endothelial system. The second form is acute and severe, with a serious fall in the blood pressure. In 4 of the author's cases of this type death occurred within an hour, and in 24 cases within a few hours. In some of the cases the chief sign was increased bowel peristalsis. The third form of hemolytic shock described by Hesse is a late form in which the first signs appear after from twelve to twenty four hours. This form is very infrequent.

Hesse rejects the theory that shock may be caused mechanically by embolic occlusion due to agglutinated erythrocytes. He believes it is due rather to an intoxication (also central damage) by fibrogen, albumin, globulin, and substances which belong to the adenosin phosphoric acid group (Petrov).

He makes the following practical suggestions:

1 The kidney function should be determined before every transfusion.

2 During anesthesia the blood pressure should be watched constantly. Every decrease spells danger.

3 The biologic test of Oehleker should be made before every transfusion.

4 Pain in the loin should be regarded as very significant.

The only successful treatment of hemolytic shock after renal decapsulation, renal denervation, and other measures have failed is the transfusion of compatible blood as is done by Filatov and Hesse. The result is surprising even after small quantities have been transfused, but it is better to give from 200 to 300 c. cm. for the purpose of detoxification. The pain in the loin ceases promptly. The new transfusion should be given as soon as possible, but may be successful after 24 or even 48 hours. In 16 cases treated in this manner there were only 2 deaths. In 1 of the fatal cases there was insufficiency of the reticulo endothelial system after removal of the spleen. In the other, the transfusion was given too late, on the sixth day. The transfusion of compatible blood is successful also in intoxication due to the products of protein decomposition in preserved blood. In cases of hemoglobinuria and anuria the intravenous injection of glucose is indicated.

(FRANZ) PHILIP SHAPIRO, M.D.

# SURGICAL TECHNIQUE

## OPERATIVE SURGERY AND TECHNIQUE, POSTOPERATIVE TREATMENT

Wach R S and Sciclounoff, F The Treatment of Hypochloremia and Pre Operative Rechlorination (Le traitement des hypochlorémies et la rechloruration préopératoire) *J de chir* 1936 45 342

The authors studied the variations in the level of the blood chlorides the urinary excretion of chlorides alkali reserve and blood and urinary urea in cases of persistent vomiting and diarrhea and other conditions causing hypochloremia They found that the injection of a hypertonic solution of sodium chloride is followed by an immediate, but very brief elevation of the blood chloride and by no increase in excretion of chloride in either the urine or the stools They therefore conclude that the chloride injected becomes fixed in the tissues If injections of hypertonic saline solution are continued daily the blood chloride level can be raised gradually in a ladder like fashion until finally the normal level is reached As soon as the normal level is reached excretion of chloride occurs in the urine

The authors report the findings in 4 cases in detail They state that the modifications in the partition of globulin chloride to plasma chloride are of no value in determining the degree of rechlorination They recommend either repeated daily injections or continuous drop by drop injection of a hypertonic solution of sodium chloride To determine if rechlorination is sufficient, the plasma chloride level should be determined If this is impractical the urinary excretion of chloride should be studied When the chloride content of the urine rises to the normal level rechlorination is complete

MAX M ZIVNIGER M D

Stewart J D Fluid Therapy in Surgery A Critical Review *New England J Med*, 1936 215 53

The body fluids occupy 3 reservoirs blood vessels, interstitial areas and cells These fluids have a salt content which must be kept constant The 3 most important factors to be considered in derangements of the body fluids are (1) the total amount of the fluid, (2) the concentration of salts and (3) the acid base balance It is the function of the kidney to regulate these factors

The plasma proteins constitute another factor It is due to the osmotic pressure of these colloid substances that fluid is kept within the capillaries in balance against the force of the blood pressure The normal level of plasma proteins ranges from 6.5 to 7.5 per cent If the level falls to below 5 per cent edema may result

Fluid therapy may be given

1 By mouth In most cases the administration of fluids by mouth is adequate, but in certain conditions, such as functional or organic derangements of the gastro intestinal tract urgent conditions, hemorrhage, and shock, it may be advisable to employ other routes

2 By rectum Water and physiologic salt solution may be absorbed from the colon in large quantities when introduced through the rectum but experimental evidence shows that glucose is not absorbed from the colon although variable quantities may be absorbed from the terminal ileum after it has passed the ileocecal valve Glucose has the disadvantage that it may undergo fermentation in the colon and produce irritation leading to expulsion of fluid given subsequently No hypertonic solutions should be given by proctoclysis in dehydration If glucose is administered by this method it should be in a 5 per cent solution

3 By hypodermoclysis This is one of the most useful methods in fluid therapy The fluid must be sterilized and given with an aseptic technique Sodium bicarbonate solution the most concentrated glucose solutions and blood cannot be given by hypodermoclysis

4 By intraperitoneal injection Physiologic salt solution a 5 per cent glucose solution Ringer's solution and even whole blood may be administered by this method However intraperitoneal injection should be used only rarely as it is associated with the danger of infection and traumatization of the viscera and peritoneum

5 By intravenous infusion This is one of the most valuable methods A large variety of fluids may be administered by vein Hypertonic or hypotonic solutions may be used

The types of fluids employed in fluid therapy are

1 Physiologic salt solution This has a 0.9 per cent content of sodium chloride Sodium chloride is indispensable for the correction of dehydration

2 Glucose solution After its injection into the blood stream glucose is rapidly taken up by the liver and muscles and converted into glycogen or oxidized within a few hours Its water of solution is then eliminated by the kidneys The diuretic effect is much to be desired in the oliguria of dehydration

3 Glucose in physiologic salt solution The intravenous injection of a 2.5 per cent, 5 per cent or 10 per cent solution of glucose made up with a 0.9 per cent content of sodium chloride may be useful as it supplies water, glucose, and sodium chloride

4 A 50 per cent sucrose solution This is better than glucose solution to lower intracranial pressure as it does not diffuse into the cerebrospinal fluid

5 A 5 per cent solution of sodium bicarbonate This is of value in the treatment of severe acidosis with dehydration

## FLUIDS USED IN FLUID THERAPY AT MASSACHUSETTS GENERAL HOSPITAL

Fluid	Nature	Method of administration	Indications	Dosage first 24 hours per kilogram body weight (c cm)
0.9% sodium chloride (physiologic salt solution)	Isotonic neutral reaction <i>in vivo</i> yields relative excess of chloride	Proctoclysis Hypodermoclysis Intravenous infusion	Dehydration with or without alkalosis or acidosis	50-100
5% glucose solution	Isotonic neutral reaction <i>in vivo</i> yields free water	Proctoclysis Hypodermoclysis Intravenous infusion	Oliguria of dehydration Ketosis Carbohydrate lack	40-80
5% glucose solution with 0.9% sodium chloride	Hypertonic neutral reaction	Intravenous infusion	Dehydration Ketosis	50-100
10% glucose solution	Hypertonic neutral reaction	Intravenous infusion	Ketosis severe Carbohydrate-lack	20-40
50% sucrose solution	Hypertonic neutral reaction	Intravenous infusion	Increased intracranial pressure	5-10
5% sodium bicarbonate solution	Hypertonic alkaline	Intravenous infusion	Severe acidosis supplementary to 0.9% NaCl	5-10
1.8% sodium lactate solution	Isotonic neutral <i>in vitro</i> produces alkali <i>in vivo</i>	Hypodermoclysis Intravenous infusion	Severe acidosis supplementary to 0.9% NaCl	10-20
6% acacia in 0.9% sodium chloride	Isotonic osmotic pressure of colloids similar to that of plasma proteins	Intravenous infusion	Shock and hemorrhage (temporary substitute for transfusion)	10-20
Blood whole or with 0.35% sodium citrate		Intravenous infusion	Hemorrhage Shock Chronic anemia Deficient plasma proteins Acute and chronic infections Hemorrhagic disease	10-20

6 A 1.8 per cent solution of sodium lactate Hartmann has advocated the use of this fluid as a substitute for sodium bicarbonate solution. It has the advantages of being isotonic and neutral. Its alkalinity is due to the gradual conversion of the lactate to glucose in the body.

7 Acacia solution. This consists of 6 per cent gum arabic in a 0.9 per cent sodium chloride solution. Acacia forms a colloidal solution which leaves the blood stream very slowly and therefore tends to hold fluid in circulation. It has a limited usefulness in the treatment of conditions with acute reduction of the blood volume, such as shock and hemorrhage, when blood transfusion cannot be done immediately.

8 Blood. Whole unmodified or citrated blood from a compatible donor may be injected in quantities ranging from 400 to 1,200 c cm.

Dehydration occurs when the intake of water and salts is insufficient or there is an abnormal loss of body fluid. It may be accompanied by acidosis or alkalosis. Loss of acid gastric juice leads to dehydration with alkalosis, and loss of upper intestinal secretions to dehydration with acidosis. The degree of dehydration may be estimated from the patient's facial appearance, the degree of thirst, and the dryness of the buccal mucosa, tongue, and skin. In the absence of diabetes insipidus or mellitus and of severe nephritis a daily output of over 1,500 c cm of urine with a specific gravity below 1.015 is strong evidence of the absence of dehydration. In the presence of conditions tending to cause dehydration, excretion of the urea nitrogen of the blood above 30

mgm per cent or of the non protein nitrogen above 40 mgm per cent is evidence of advanced dehydration. Changes in the plasma bicarbonate and chloride from their normal values may be regarded as indirect evidence of dehydration.

The fluids found satisfactory in fluid therapy on the Surgical Services of the Massachusetts General Hospital, Boston, are listed in a table. The dosage recommended in this table is only approximate as there is a wide variation in the amount required in different cases.

ALTON OCHSNER, M D

## ANESTHESIA

Livingstone, H., Davies, M. E., and Morgan, M. Anesthesia in Neurosurgical Operations. *Anesth & Anal.* 1936, 15: 169.

This article is based on 791 cases in which 1,080 neurosurgical operations were performed.

The authors state that with the patient in the sitting position there is an unavoidable slumping, the danger of aspiration is increased, and frequently a marked drop in the blood pressure occurs. Signs of collapse may be noted as soon as the patient, especially the conscious patient, is placed in this position. Immediate relief when the patient is lowered to the horizontal position indicates that these signs are due to cerebral anemia. Of the cases reviewed, signs of syncope were less frequent in those in which morphine, scopolamine, novocain anesthesia was induced than in those with anesthesia of other types.

In frontal and frontotemporal operations the supine position increases the danger of aspiration and renders it difficult for the anesthetist to reach the eyes, nose, and mouth. In the temporal operations performed in the reviewed cases the shoulder was propped up and the head elevated and turned to reduce the danger of aspiration.

Avertin is given in doses of from 80 to 95 mgm per kilogram of body weight or less in the cases of patients in poor condition. It is not employed in the presence of disease of the lungs, liver, kidneys, or lower bowel. The use of avertin is one of the simplest methods of inducing anesthesia for neurosurgical procedures. The authors have found it more satisfactory than the rectal administration of ether and oil.

Oxygen under pressure must be available for instant use in the event of respiratory failure and a patent air way must be maintained at all times. Following severe hemorrhage artificial respiration may be necessary to maintain life until a blood transfusion can be given. The authors cite a case in which the patient was kept alive by this means for 45 minutes until normal respiration was re-established.

The use of adrenalin to control hemorrhage is avoided by the authors as it has been followed by alarming drops in the blood pressure. The blood

pressure may fall with the elevation of a bone flap, the use of the electric cautery, the removal of a tumor, hemorrhage, or a gradual loss of body fluids. As a rule, though not always, the pulse rate is increased.

In the cases of patients with increased intracranial tension the use of narcotics is inadvisable because of the frequency of respiratory difficulty. Respiratory difficulty is most apt to occur when there is manipulation or disease near the respiratory center.

Postoperative observations support the claim of Maibes and Holman that the formation of thick tenacious mucus, the probable cause of massive collapse of the lungs, is favored by the pre-operative administration of atropin. In the reviewed cases other pulmonary complications were also more frequent following the use of atropin, morphine, or scopolamine, especially when these drugs were given before the induction of ether anesthesia.

Except in the cases in which there was sufficient pressure to cause respiratory embarrassment, ether added no more risk than novocain when abolition of consciousness or of restlessness was required.

Avertin combined with novocain seems to be the most satisfactory anesthetic for adults except when it is necessary to be able to arouse the patient. For children, ether used alone is the anesthetic of choice.

EDWARD S. FLATT, M.D.

# PHYSICO-CHEMICAL METHODS IN SURGERY

## ROENTGENOLOGY

Kelly, J. F. and Dowell, D. A. The Present Status of the X-Rays as an Aid in the Treatment of Gas Gangrene. *J. Am. Med. Ass.*, 1936, 107, 1114.

Complete and rapid recovery in a case of gas gangrene involving a lower extremity which was treated by roentgen irradiation in 1928 led the authors to apply similar treatment to 7 additional cases referred to them in the following three years. Five of these, with involvement of an extremity, responded in the same startling manner. The authors believe that in the 2 others, in which the trunk was involved and death resulted, the rays employed were of insufficient penetrating power. Serum treatment was given simultaneously in all of the cases.

In the next three years 2 more cases were treated by the method described and data on 30 others treated elsewhere in a similar manner were collected. Of this series of 32 cases, serum was administered in 30. Of 9 patients with trunk involvement, all recovered. Of the 24 with involvement of an extremity, amputation was done on 11. Of the latter 5 died. Two died of causes not directly attributable to the gas gangrene. The 3 others who died probably received insufficient roentgen therapy. Of the 13 patients with involvement of an extremity who were not subjected to amputation, all lived.

Encouraged by the results obtained from the use of roentgen rays as an aid in the treatment of gas bacillus infection, the authors sent a questionnaire regarding this treatment to radiologists and surgeons throughout the country. In reply they received data on 16 additional cases. All of the 16 patients lived. Five of them received no serum and only 2 had an amputation.

Of the total number of 56 patients whose cases are reviewed only 5 (8.9 per cent) died of gas bacillus infection. This mortality rate compares favorably with that in any series of cases of gas bacillus infection so far reported in the literature. The results seem to the authors to justify the conclusion that roentgen irradiation is of definite value as an aid in the treatment of gas bacillus infection and should be used in all cases. It appears that amputation when necessary should be postponed until the patient has recovered from shock and the gas bacillus infection. The use of serum is regarded as advisable.

The roentgen technique recommended is the administration of treatments morning and evening for at least three days with sufficient voltage to insure penetration of the involved tissue—from 90 to 100 kv. on an extremity with filtration by 2 mm. of aluminum, from 130 to 160 kv. on the trunk with increased filtration and about 100 r per treatment over each area.

Meyerding, H. W. Roentgen-Ray Therapy of Bone Tumors. *J. Bone & Joint Surg.*, 1936, 18, 617.

Although all tissue is radiosensitive to some degree, it has been found that some tumors, such as osteogenic sarcomas, are comparatively resistant or insensitive to irradiation whereas others such as endothelial myelomas, are so remarkably sensitive that irradiation is of aid in their diagnosis.

Not all tumors are amenable to surgical treatment and certainly not all are radiosensitive enough to be considered amenable to treatment with the roentgen rays. In certain cases, a combination of surgery and irradiation is more beneficial than either method alone. In others especially those of benign tumor, surgery cures quickly and surely, in minimal time, and permits microscopic study of tissue with consequent verification of the clinical, roentgenographic, and surgical diagnosis. A claim of cure from irradiation without microscopic proof thereof is not always tenable. Members of the medical profession look to the teamwork of the family physician, surgeon, roentgenologist, and pathologist to bring about advances in knowledge from which earlier diagnosis, efficient treatment, and an increased number of cures may be expected. To this end the rôle of the family physician is probably most important for if the patient is treated for rheumatism or sprain until the tumor has become obvious, valuable time will be lost and treatment of any type will be less effective.

The pre-operative application of irradiation has recently been the subject of considerable discussion and has gained acceptance in some medical centers. The author believes that its field of usefulness is very limited and its indiscriminate use may be more harmful than beneficial. What is needed is early diagnosis, destruction or removal of the tumor, and the prevention of metastasis. On the basis of his observations Meyerding is unable to recognize the value claimed for irradiation preceding biopsy or for routine irradiation of malignant tumors before amputation or excision. Although such treatment may give the roentgenologist an idea as to the radio-sensitiveness of the tumor, the temporary improvement following it gives the patient a sense of false security and as the result exploratory operation may be postponed and the advantages of early and accurate diagnosis, immediate surgical treatment, and examination of tissue by a pathologist may be lost.

Postoperative irradiation has been employed following biopsy, excision, curettage, and amputation in the hope that any malignant cells remaining may be destroyed, that metastasis may be prevented, or that unrecognizable metastasis may be dealt with adequately. The beneficial effects of this form of treatment are due partly to the action of the rays on the blood vessels and the formation of connective tissue. The malignant cells which remain become

enclosed in masses of fibrous tissue with a poor blood supply their growth being thereby inhibited. Delay of recurrence may be explained in this manner in some cases but the author has seen malignant cells at the site of previous operation and extensive irradiation in cases in which clinical manifestations of tumor were absent. Postoperative irradiation may be one of the factors responsible for the greater number of 5 year cures recorded today than formerly but in Meverding's opinion an equally important factor is earlier diagnosis which permits efficient treatment.

The response to irradiation will usually be determined by the predominant type of cell. A certain type of tumor may vary in the degree with which it reacts; it may be wholly or only partially destroyed. There is a difference between the radiosensitiveness of tissues and cells of normal structures and the radiosensitiveness of tumors. A mixed-cell tumor with a great proportion of radiosensitive cells will for a time retrogress rapidly under treatment by irradiation but after these cells have been destroyed the remaining more resistant cells will continue to grow and will not be affected by continuation of the treatment. Roentgenograms should be taken from time to time to visualize the effects of the irradiation.

Benign osteogenic tumors are those commonly known as osteosarcomas, osteochondromas, chondromas, and fibromas. They are relatively insensitive to irradiation. As they are readily cured by surgical operation treatment by roentgen rays has received little attention. For cases in which there is doubt as to the malignant transformation of a tumor of this group the author favors excision and postoperative irradiation. He states that the tumor must be entirely removed especially if it is a chondroma and that if its complete eradication is doubtful the actual cautery should be employed.

There has been considerable difference of opinion as to the relative merits of surgical operation and irradiation for the treatment of benign giant-cell tumors. Because of their situation or size and the danger of hemorrhage and infection some of them cannot be treated by surgery. For such tumors irradiation is advisable. Considerable judgment is required to determine the most advantageous form of treatment. The author cannot agree with those who believe that radiotherapy has solved the problem. It is well to remember that the roentgenographic characteristics of benign giant-cell tumors do not always positively prove the absence of malignancy whereas if operation is performed the opportunity is afforded for microscopic examination of frozen sections of tissue while the surgeon is at work.

Hemangioma affecting bone is moderately radiosensitive and under moderate dosage, repeated at regular intervals for a number of months gradually regresses until healed.

Hemangio endothelioma is less radiosensitive than endothelioma or hemangioma and tends to improve temporarily under irradiation.

Endothelial myeloma is the most radiosensitive of bone tumors and completely regresses under irradiation competently applied. So uniform is its response to irradiation that diagnostic irradiation has been advocated and is considered sometimes to be more reliable than the opinion of the average pathologist. While the tumor and symptoms may disappear under treatment and the bone may assume a normal appearance the treatment often fails to effect a cure because of metastasis. Early radiotherapy before metastasis has occurred may result in permanent cure. Opinion recently appears to favor amputation, irradiation and the administration of Coley's toxins.

Osteogenic sarcoma as a group are highly resistant to irradiation. Although such treatment may cause some regression of the symptoms Meverding believes it is of value chiefly because when it is given in conjunction with surgery it relieves the pain. Studies in the larger clinics and data assembled by the Registry of Bone Sarcoma do not hold out much hope of permanent benefit from irradiation. Excision and amputation appear to be most beneficial. When the patient will not consent to operation irradiation may be chosen. Meverding is not impressed by the use of irradiation as a preliminary form of treatment. He believes that early diagnosis, radical surgical operation, postoperative roentgen ray therapy and the administration of toxins have given the most encouraging results.

Multiple myeloma presents a hopeless surgical problem and irradiation gives only mildly encouraging results. When the disease is recognized early relief of local symptoms and some retardation of growth with considerable improvement for a period of from one to two years is about all that can be expected. The disease is fatal in spite of any known treatment.

In cases of metastasis from carcinoma of the breast, thyroid gland, uterus, stomach and prostate gland the pain may be relieved to some degree and the rapidity of growth may be delayed by roentgen ray therapy but the generalized process goes on and benefit from the treatment is frequently questionable. These metastatic growths are often considered primary bone tumors, their nature remaining unrecognized until late in the disease or until autopsy is performed. Nevertheless the author believes that the prolongation of life and relief of pain obtained by roentgen ray therapy would cause anyone afflicted to choose this method of treatment.

It is obvious from experience extending over a period of years that roentgen ray treatment of bone tumors is not a cure all. The possibilities of irradiation have not been exhausted and time will bring about greater improvement in its application and increase its therapeutic value. For improvement of the results surgeons and roentgenologists must continue to co-operate. When the family physician becomes able to make the diagnosis earlier and will then refer patients to centers where every aid is available progress through further research will follow.

Merritt, E. A. Radiation Therapy of Inoperable Intra-Abdominal Malignancy. With Special Reference to the Stomach. *Am J Roentgenol*, 1936, 36 324

The author presents a brief historical review of the literature relating to roentgen irradiation of gastric malignancies and cites statistics which indicate that, save in exceptional cases, surgery alone offers little hope of cure. Early diagnosis is all important. For cases in which the lesion is resectable, the author does not advocate irradiation.

The diagnosis can be made with a higher degree of accuracy by roentgen examination than by any or all other methods but roentgen examination is of no aid in determining the radiosensitivity of the lesion. This may be ascertained by subjecting the patient to irradiation therapy for two or three weeks, and when it has been established this form of treatment may prove life saving.

The author's contribution consists of a preliminary report on a series of 13 cases treated by irradiation since January, 1934. Four of the patients are still living. Three are apparently well and free of all evidence of disease, but 1 has roentgen signs of malignancy. The 9 others died of the disease. The cases were taken for treatment without regard to the condition of the patient or the extent of the involvement of the stomach. Most of the patients who succumbed were in a dying condition when treated. This was true also of 1 of the 3 who are living and well today. The treatments were very well tolerated. They were given daily, except Sunday, by the modified Coutard technique. The cases are tabulated as to age, sex, location of the lesion, survival after treatment, number of treatments, and tumor dose. Four of them are reported in detail with roentgenograms. *JOSEPH HARTUNG M.D.*

Timpano, M. The Immediate Results of Roentgenotherapy with Fractionated and Prolonged Dosage in Malignant Tumors of the Female Genitalia (Primi risultati della roentgenoterapia a dosi frazionata e protratte nei tumori maligni dei genitali femminili). *Radiol med*, 1936 23 673

Timpano reports on 56 women with cancer of the genitalia treated at the Bergamo Radiological Institute in the period from 1932 to 1934 inclusive with fractionated and prolonged roentgen therapy, either alone or combined with radium. Thirty two of the tumors were epitheliomas of the cervix, 5, epitheliomas of the vulva and vagina, 10, carcinomas of the body of the uterus. 6, recurrences in the cervix and body after irradiation therapy, and 3, cancers in the stump following hysterectomy. Almost all of the patients were inoperable. A number had cardiorenal insufficiency and 4 had syphilis. The total dose was from 6,000 to 9,000 r distributed over from 40 to 60 sessions. The treatment lasted from one and a half to two months.

Except in cases in the terminal stage, the immediate results were good. The long series of treatments were well tolerated. In some cases the gen-

eral improvement was remarkable, and in a few it lasted for more than a year. Patients with very extensive lesions and in poor general condition showed only slight amelioration, and a distinctly unfavorable influence was noted in those who were obliged to return to poor home conditions and an insufficient diet. The analgesic effect was noteworthy in the less advanced cases but slight in the last stages. In the cases of recurrence the treatment had almost no effect.

The results in the cases of the 32 patients regarding whom information was obtainable at the beginning of 1936 are analyzed in tabular form. Although they do not bear out the hopes aroused by the immediate results, they are nevertheless worthy of consideration. One of the 7 women treated for primary cancer (all sites) in 1932, 6 of the 13 treated in 1933 and 1 of the 5 treated in 1934 were still living. Of 7 treated for recurrent cancer between 1932 and 1934, all were dead. Two women operated upon for malignant tumors of the ovary in 1932 and 1934 respectively and afterward treated by irradiation were in excellent health.

There is no evident relationship between the total dosage and the therapeutic effect. Success depends less upon a large amount of irradiation than upon the extent, type, and sensitivity of the tumor and the general condition of the patient. The addition of radium to the x ray therapy does not appreciably improve the late results.

Although the series of cases was too small and the observation period too short to warrant a definitive opinion on the results of roentgenotherapy with high and prolonged dosage in this type of cancer, it at least proves that women with lesions belonging to Groups 3 and 4 are benefited by such treatment temporarily and that many of them survive for from one to two years in good general condition. *M. F. MORSE M.D.*

Leucutia, T. The Comparative Clinical Value of Supervoltage Roentgen Therapy. *Am J Roentgenol*, 1936, 36 350

From the physical standpoint, roentgen therapy with supervoltages has at least 3 advantages over roentgen therapy with 200 kv. as there is an increase in the differential action due to better absorption conditions, a proportionately larger dose can be administered, and a greater percentage depth dose can be obtained with increasing voltages. Obviously, it will require time to determine whether the improvement in these physical factors is followed by similar improvement in the clinical effect. However, until comprehensive five year statistics are published the problem may be analyzed on the basis of the comparative response of certain arbitrarily chosen tumors mostly cancerous in nature. Since it cannot be said that the general laws of radiosensitivity are influenced to any appreciable extent, it appears best to consider the anatomic location of such tumors since, after all, the enhanced therapeutic effect must be attributed to the better



irradiation conditions created by the more advanced physical factors

**Superficial lesions** In this group are included malignant tumors of the skin and of structures lying very near the surface of the skin. In the great majority of these lesions superficial or deep roentgen therapy or a combination of both will yield satisfactory results. However if the tumor is very bulky rising 3 cm. or more above the surface or penetrating for a like distance into the deeper layers, super-voltage roentgen therapy used alone or in association with the 2 other types of roentgen procedures in the form of mixed irradiation undoubtedly gives better results. Moreover, because of the more uniform distribution and larger percentage dose in the first 2 or 3 cm. layers beneath the surface and because of the greater tolerance of the skin treatment through a single portal will appear sufficient in many cases in which otherwise cross firing through several portals would be necessary.

**Lesions about the face and neck** There is hardly any region of the human body which offers as complete a medium for heterogeneous irradiation as the face and neck. The anatomic structures in this region render the volume to be irradiated so variable in conformation and heterogeneous in density that exact calculation of a depth dose is impossible. Therefore here too supervoltage roentgen therapy, especially by the fractionated protracted Contard method constitutes a step forward.

**Intrathoracic lesions** Another group of lesions in which roentgen therapy with the former methods is most difficult is represented by tumors situated within the thoracic cage. On the one hand there is the necessity of using large doses and therefore cross firing through several large fields and on the other there is the exceedingly great danger of producing fibrosis of the lung. As supervoltage roentgen therapy helps to solve these problems to a great extent its use in cases of mediastinal tumor bronchogenic carcinoma, and pleural malignancies is of decided benefit.

**Pelvic and abdominal lesions** In this group of lesions the treatment is most effective in carcinoma of the cervix sometimes even in advanced stages next most effective in carcinoma of the ovary, and effective to a less degree in carcinoma of the prostate and rectum.

All in all it appears that the addition of supervoltage roentgen therapy to the irradiation armamentarium represents an important step the value of which grows more evident as statistical reports on the results are published.

## RADIUM

Imsholt S. The Alpha and Beta Rays in Skin Therapy. Proc Roy Soc Med Lond 1936 9 1401

Most radio active elements give off 3 types of rays the alpha rays, consisting of positively charged helium nuclei the beta rays negatively charged

electrons, and the gamma rays, which are identical with very hard x rays. The alpha and beta rays are corpuscular emissions. In radium the alpha rays represent over 80 per cent of the total irradiation energy and the beta rays about 20 per cent. As both have a very energetic biologic effect which is limited to the tissues closest to the point of action, they may be used advantageously in superficial skin therapy.

**Alpha rays** On account of the large size and the great electrical charge of the particles alpha rays are barely able to penetrate a thick sheet of paper and are completely absorbed by a thin foil of aluminum. They can be used only in one form namely as a solution of thorium X in propylalcohol or ointment which is painted on the lesion by means of a small metal applicator. Scales or crusts must be removed beforehand. After the alcohol has dried a thin layer of collodium may be applied. Because of the very superficial effect there is no danger of injury. The author has repeated the application as many as 20 times over the same area without causing damage to the skin. Thorium X is the remedy *par excellence* for the treatment of psoriasis especially of the small spotted forms and of some types of neurodermatitis.

**Beta rays** On account of the smaller size and the smaller electrical charge of the particles beta rays penetrate the skin a little better than the alpha rays. However they do not penetrate more than a few millimeters. They may be applied by means of lacquered radium plaques lightly filtered radium tubes or capsules and various radium emanation preparations. The author and Jacobsen use a radium emanation plate which is obtained by suspending emanation tubes in melted wax. The glass of the tubes is crushed within the mass of the melted wax which after cooling is cut into plates 2 mm. thick and of various sizes and shapes. The strength of the irradiation is expressed in millicuries per square centimeter. As the emanation deteriorates about 16 per cent in twenty four hours and there is an additional loss of 10 per cent due to evaporation the plate must be tested after its production and applied only when its strength is known. A very common dose is from 0.7 to 0.9 mc/hr per square centimeters given with plates of from 0.02 to 0.1 mc per square centimeter applied for from ten to thirty hours. Overdosage may cause permanent damage to the skin although of only superficial nature. Beta irradiation is of value in most cases of psoriasis, in chronic neurodermatitis, in chronic infiltrated plaques of eczema, in nevus flammeus, in keloids and in multiple warts. There should be an interval of from three to four weeks between the applications and not more than 4 treatments should be given over the same area except in cases of keloids.

From the use of alpha and beta rays in the treatment of skin lesions over a period of ten years the author concludes that the method is very easy effective and safe.

T. LEVYMAN M.D.

MISCELLANEOUS

Cramer, W. Experimental Observations on the Rationale of Radiotherapy *Lancet*, 1936, 231 668

The regression of a malignant new growth after irradiation is the result of a complex process which is initiated by damage to the tumor cells and is followed by a repair reaction on the part of the normal tissues which leads to gradual replacement of the tumor by young cellular connective tissue.

Malignant tumors in general are no more radio sensitive than normal tissues in general. Both show very high radiosensitivity and very high radio resistance. The reason is not entirely clear. It seems incorrect to attribute all differences to the variation in the blood supply alone.

The radiosensitivity of malignant cells can be varied. In the absence of oxygen such cells become very radioresistant. On the other hand, their radio sensitivity can be greatly increased by inhibiting respiration either by HCN or by cold. It appears that if the vascular connective tissues surrounding the tumor are damaged by repeated irradiation the malignant cells pass into a stage of partial anoxia which renders them radioresistant.

The damage inflicted on cells of transplantable tumors by sublethal doses of radium persists for some time but is completely reversible. This is of great importance in connection with the rationale of the fractionated method of radiotherapy. It appears that the period of recovery of malignant cells from very small doses is very much longer than that of normal tissues. This is rather surprising since formerly it was thought that the effect of small doses of irradiation passes off very rapidly. At any rate it explains the success of the Coutard method in man since by applying very small doses of irradiation at suitable intervals it becomes possible to produce a cumulative effect in a tumor with a non-cumulative or much less cumulative effect in the skin and thus to bring about a selective action on the malignant tissue.

The experiments were carried out with transplantable mouse carcinoma, Strain 2146 (a polymorphous skin carcinoma originally produced by tar painting) which always takes when transplanted, grows very rapidly, and practically never undergoes spontaneous regression. Two types of irradiation were used—a mixture of hard beta and gamma rays in one series and gamma rays alone in another. The effect was estimated by studying the rate of growth and the length of recovery of the tumor cells. The technical procedure is described in detail and the results of the experiments are shown graphically.

T. LEICHTER, M.D.

Locher, G. L. Biological Effects and Therapeutic Possibilities of Neutrons. In *J. Roentgenol.*, 1936, 36: 1.

In a brief general discussion of the nature and behavior of neutrons, Locher cites the fact that elements may be made radio active artificially by

neutron bombardment. He states that the possibility of applying such radio active elements to biological research and irradiation therapy has aroused much interest, and that this field will doubtless be explored as fast as experimental facilities can be established and experiments performed.

He discusses the biological effects expected from neutron irradiation at length. These are of 2 kinds: (1) effects produced in the bulk of tissue as the result of elastic collisions of neutrons especially those with hydrogen nuclei, and (2) effects produced in specific regions where even small concentrations of highly absorbing atoms are present. In either case the ionizing action which arises from neutron bombardment, like that from gamma and roentgen irradiation, will probably be chiefly destructive and hence applicable to such problems as the production of mutations in animals and plants and the destruction of malignant cells.

The action of neutrons differs conspicuously from that of other irradiations in that (1) its effects are, broadly speaking, greatest in light elements, particularly hydrogen, whereas those of the gamma type of irradiation, for example, are greatest in heavy elements; (2) the scattering of neutrons by hydrogen results in the production of short range but highly ionizing particles in contrast to the long range, low ionizing paths of electrons ejected by gamma rays, and (3) slow neutrons can be subjected to strong selective absorption by certain elements and this absorption may result in the spontaneous release of atomic energy from the atoms in which absorption occurs.

In discussing the physical problems that must be solved before it will be possible to calculate the exact amount, form and distribution in which energy will be liberated in any given mass of material irradiated with a neutron beam from a (practical) source of neutrons, the author cites the necessity for:

- 1 The development of simple and reasonably accurate means of measuring the number of neutrons per second in any beam, and the distribution of their velocities.
- 2 Determination of the ratios of nuclear absorption (true absorption) and scattering for different elements and for neutrons of various energies.
- 3 Further studies of the scattering of neutrons of various velocities by various substances to determine the mean free paths between successive collisions under various conditions.
- 4 Further investigation of the processes and energy relations in nuclear transformations to determine for each element what processes occur, what isotope is involved, the kinds and energies of the particles and quanta emitted by the elements so disintegrated, and the influence of the velocities of the neutrons on these processes.

In the field of application of neutrons to experimental biology investigation must be carried out with regard to:

- 1 The bulk effects of neutrons in living tissue.

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**Superficial lesions** In this group are included malignant tumors of the skin and of structures lying very near the surface of the skin. In the great majority of these lesions superficial or deep roentgen therapy or a combination of both will yield satisfactory results. However if the tumor is very bulky rising 3 cm. or more above the surface or penetrating for a like distance into the deeper layers super-voltage roentgen therapy, used alone or in association with the 2 other types of roentgen procedures in the form of mixed irradiation undoubtedly gives better results. Moreover because of the more uniform distribution and larger percentage dose in the first 2 or 3 cm. layers beneath the surface and because of the greater tolerance of the skin treatment through a single portal will appear sufficient in many cases in which otherwise cross firing through several portals would be necessary.

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The action of neutrons differs conspicuously from that of other irradiations in that (1) its effects are, broadly speaking, greatest in light elements, particularly hydrogen, whereas those of the gamma type of irradiation for example, are greatest in heavy elements, (2) the scattering of neutrons by hydrogen results in the production of short range, but highly ionizing particles in contrast to the long range, low-ionizing paths of electrons ejected by gamma rays, and (3) slow neutrons can be subjected to strong selective absorption by certain elements and this absorption may result in the spontaneous release of atomic energy from the atoms in which absorption occurs.

In discussing the physical problems that must be solved before it will be possible to calculate the exact amount, form, and distribution in which energy will be liberated in any given mass of material irradiated with a neutron beam from a (practical) source of neutrons, the author cites the necessity for:

- 1 The development of simple and reasonably accurate means of measuring the number of neutrons per second in any beam, and the distribution of their velocities.

- 2 Determination of the ratios of nuclear absorption (true absorption) and scattering for different elements and for neutrons of various energies.

- 3 Further studies of the scattering of neutrons of various velocities by various substances to determine the mean free paths between successive collisions under various conditions.

- 4 Further investigation of the processes and energy relations in nuclear transformations to determine for each element what processes occur, what isotope is involved, the kinds and energies of the particles and quanta emitted by the elements so disintegrated, and the influence of the velocities of the neutrons on these processes.

In the field of application of neutrons to experimental biology investigation must be carried out with regard to:

- 1 The bulk effects of neutrons in living tissue.

section of fibrosarcomas encountered in practice. The great majority of the patients were followed to the time of their death or for at least three years.

Fibrosarcoma is not a disease of young persons. The mean age at onset of the symptoms in both sexes is about fifty years. Its incidence in decades is not very different from that of carcinoma, and its incidence in males and females is about equal.

The diagnosis is frequently delayed because, as pain is not an early symptom, the patient does not seek relief promptly. Swelling is usually the first sign and in many cases the condition is superficial in the earlier stages. For some time the tumor may be freely movable. Examination of the gross specimen usually shows a pale fibrous somewhat infiltrating tumor tending to expand the surrounding structures and showing varying degrees of vascularity. Necrosis is not nearly so marked a feature as in epithelial tumors. Hardness is frequently absent.

Trauma is not an etiological factor.

In most of the cases reviewed the tumor was treated surgically. The operations varied from local to radical excision. In cases of tumor of the extremities the latter was sometimes amputation. Operation was most successful when excision was done with wide margins below as well as laterally. A small proportion of the patients received post-operative treatment with the roentgen rays and radium but in none did the irradiation have any notable influence on the course of the disease. In several instances recurrences progressed in spite of irradiation therapy. The interval from the onset of symptoms to the beginning of treatment bore no definite relation to the outcome.

The authors regard the classification of fibrosarcomas as a difficult problem. They recognize neurogenic fibrosarcoma as a definite subtype. Their criterion of a high degree of malignancy has been the presence of a fair to marked number of tumor giant cells. The number of such cells often parallels mitotic activity fairly closely. However the neurogenic tumor with tumor giant cells is not strikingly different in behavior from a growth without such cells.

As recurrence developed in over a third of the cases reviewed (64) it is obvious that local removal is often insufficient. If recurrence takes place it usually occurs within a year. In cases with recurrence the prognosis is grave but 8 of the patients are alive and well three years after treatment of a recurrence.

Metastasis occurred in 34 of the reviewed cases. In only 6 did it precede local recurrence. The viscera most frequently involved were the lungs. Metastasis of sarcoma to lymph nodes occurs occasionally.

The location of the tumor may be of more importance than its histologic type. Fibrosarcomas of the head are particularly malignant and difficult to treat. Of 24 patients treated for fibrosarcoma of the head, only 21 per cent are living without disease

after three years. In the cases of well differentiated neurogenic fibrosarcoma of the head the average duration of the disease was twice as long as the duration in the cases of fibrosarcoma of the head and 10 times as long as that in the cases of sarcoma with tumor giant cells.

Of 62 patients with sarcoma of the extremities only 24 per cent are living and well three or more years after the onset.

The authors discuss also 38 cases of sarcoma of the trunk, 12 of fibrosarcoma within the abdomen and of the genitalia, 17 of adenofibrosarcoma of the breast, and 5 of desmoids. Of the 17 patients with adenofibrosarcoma of the breast, 16 have recovered. Of 8 subjected to radical resection of the breast, none showed any evidence of involvement of the lymph nodes. The authors believe that simple amputation of the breast with removal of the fascia overlying the pectoralis muscle is the method of choice.

Five fibrosarcomas of special interest are discussed in detail. Two of these developed on the basis of roentgen and radium burns.

HARVEY S. ALLEN, M.D.

#### Pentimalli F. Dialysis of the Perfusion Liquid of Chicken Sarcoma (Dialisi del liquido di perfusione del sarcoma del pollo). *Tumori*, 1936, 22, 337.

In a previous article Pentimalli differentiated spectroscopically the absorption band of the perfusion liquid of a tumor from that of blood plasma. In the course of the experiments, however, he found that in the perfusion liquid there are many other substances which contribute to the absorption and may mask the absorption band and thus the presence of the protein substance. In order to eliminate these interfering substances he resorted to dialysis through a series of membranes such as cellophan or collodion tubes. The dialysis was always carried out with a 0.9 per cent sodium chloride solution at room temperature.

For successful experimentation the tumors must have been transplanted recently and must grow rapidly. Slowly growing or necrotic tumors should be discarded.

In his experiments Pentimalli found that a perfusion liquid of chicken sarcoma which spectroscopically shows a generic absorption band with neither a maximum nor a minimum when dialyzed through a cellophan tube against a 0.9 per cent solution of sodium chloride shows an absorption band with a maximum wave length of  $\lambda = 2750 \text{ \AA}$  and  $\lambda = 2760 \text{ \AA}$ . This is due to the elimination during dialysis of all substances which generically participate in absorption. The absorption band corresponds to a protein and may be clearly demonstrated when its concentration in the perfusion liquid is not less than 1 mgm per cent.

The absorption band is directly proportional to the hoflogic activity of the liquid in the sense that a clear and pronounced band of absorption corresponds after inoculation into an animal to a con-

siderable tumor growth. However, the absence of an absorption band does not exclude tumor formation if the liquid is inoculated into an animal because tumors may form also after the inoculation of liquids with a protein content as low as from 0.3 to 0.4 mgm per cent. With these minimal concentrations, absorption bands cannot be demonstrated, not even after dialysis.

As the perfusion liquid loses a considerable part of its activity during dialysis, it is assumed that the active group must also be present in the diffusible fraction. Following dialysis there is therefore a loss of residual nitrogen.

Accordingly, the most plausible theory is that the agent is not identifiable with a protein but is present in the perfusion liquid, in part free and in part absorbed by the protein. The latter acts as a vector or support, or as a colloidal part of the active group.

RICHARD T. SOMMA, M.D.

### DUCTLESS GLANDS

Merritt, E. A., and Lattman, I. X-Ray Treatment in Hyperparathyroidism. *Radiology*, 1936, 26, 673.

In 1933 Merritt reported a series of cases of hyperparathyroidism treated by X-ray irradiation. Since 1931 he and Lattman have treated a comparatively large number in this manner. They believe that the occurrence of pathological fractures in the absence of malignancy or an unexplained cystic bone disease warrants at least a therapeutic test of irradiation over the cervical area. The purpose of the irradiation is to produce an inhibitory effect on the function of the parathyroids. Surgery in these conditions is not a simple procedure, as frequently the tumor is difficult to find or no tumor is present. The location

and number of the lesions is not constant. In cases in which enormous doses of irradiation have been administered for malignancy in the neck region tetany and myxedema have not occurred. The authors believe that in all cases of diagnosed or suspected hyperparathyroidism X-ray therapy should be given a trial before surgery is undertaken.

The X-ray findings in a typical case of hyperparathyroidism are characteristic. They consist of decalcification associated with multiple cystic areas and a uniform granular mottling, particularly in the skull. The cysts found are most commonly at the site of most active growth, the metaphysis. The vertebrae show decalcification and flattening and are often compressed. An increase in the serum calcium and a decrease in the serum phosphorus are not constant findings. Pain in the affected bones is a common complaint. Deposits of calcium are sometimes discovered in the kidneys and lungs.

The factors in the authors' irradiation technique are: an anterior cervical portil measuring 15 by 15 cm., which extends from the chin to the sternum, 220 kv., 20 ma., filtration with 0.5 mm. of copper, and a distance of 50 cm. Two hundred and fifty roentgens are given daily for four successive days. After a period of three weeks the series is repeated. Usually two or three series are sufficient, but in some cases four or five may be necessary.

In many cases the pain decreases or ceases after the first treatment. Regeneration of bone is usually noted from two to four weeks after the first series of irradiations. Also after the first series the general condition improves markedly and the blood calcium and phosphorus, if disturbed, usually return to normal.

The authors report seven cases in which the results were uniformly good. LAEL E. BARTZ, M.D.

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NOTE—THE BOLD FACE FIGURES IN BRACKETS AT THE RIGHT OF A REFERENCE INDICATE THE PAGE OF THIS ISSUE ON WHICH AN ABSTRACT OF THE ARTICLE REFERRED TO MAY BE FOUND

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## GENITO-URINARY SURGERY

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*Supplementary to*  
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# INTERNATIONAL ABSTRACT OF SURGERY

MARCH, 1937

## ABSTRACTS OF CURRENT LITERATURE SURGERY OF THE HEAD AND NECK

### EYE

Burky E. L. Studies on the Action of Staphylococcus Toxin and Antitoxin with Special Reference to Ophthalmology. *Am J Ophth* 1936, 19 841

Strains of staphylococci isolated from normal and pathological conjunctiva and other sources can be divided into 3 groups largely on the basis of the pathological changes they produce in rabbits. On intravenous injection into these animals the strains of one of these groups cause death through the action of a preformed exotoxin within from twenty four to forty eight hours. Such strains are found in blepharconjunctivitis and other chronic inflammations of the skin and mucous membranes. When the exotoxin is injected intracutaneously into rabbits it produces a high degree of immunity against both the toxin and living cultures.

Filtrates of the second group are not lethal to rabbits, but broth cultures injected intravenously cause the formation of multiple abscesses primarily in the kidneys and secondarily almost anywhere in the tissues and death after forty eight hours or more. Such strains are recovered from styes, boils, and osteomyelitis.

Strains of the third group isolated from normal surfaces, have no demonstrable effect on rabbits.

Filtrates of Groups 1 and 2 precipitate with staphylococcus antitoxin while those of Group 3 do not. Pigment and hemolysin production are in constant phenomena and cannot be predicted so well as precipitation and the pathological changes produced in rabbits.

Experiments in the production of active immunity by the intracutaneous injection of toxic filtrate showed (1) that an active immunity against the toxin can be obtained by injections of toxin, (2) that the immunity is active against non toxic, but pathogenic strains of staphylococci and (3) that the toxin is essential for the production of immunity.

The strains recovered from recurrent lesions such as styes and boils usually fall into Group 2. They

produce little or no toxin and are poor antigens. Immunity produced by the infection or by the injection of vaccine is relatively slight and disappears quickly. It seems probable that good results from vaccine therapy may have been due to the chance presence of the toxin. It is believed by some that all pathogenic strains of staphylococci produce a toxin if properly cultivated. If this is true, the method of vaccine production is of extreme importance.

Experiments in the production of passive immunity in rabbits showed that the immune serums protect normal rabbits from lethal doses of the toxin, a neutralizing serum having been obtained after a single injection of the toxin alone.

The results of experiments to determine the therapeutic effect of immune rabbit and horse serums have so far been inconclusive.

Except for an occasional non reactor practically all normal human subjects show similar reactions to toxin. Newborn infants do not react to dilutions of 1:100 and 1:10. The reactions increase with age until adolescence. Similar reactions have been observed in rabbits. A rough correlation exists between lack of cutaneous reactivity and a high serological titer. Apparently a small cutaneous reaction and a high serological titer indicate a relatively high state of immunity. The cutaneous and serological reactions of persons with known staphylococcal infections are not uniformly related, but as a rule clinical improvement is associated with a decreased reaction and a high titer. In cases of iritis or uveitis of unknown cause there is usually a large dermal reaction and the serums contain relatively small amounts of complement fixing bodies for the toxin.

Staphylococcus toxin has been used for active immunization in 2 types of infection (1) styes, boils, carbuncles, and osteomyelitis, and (2) chronic blepharconjunctivitis. The latter is usually caused by a Group 1 organism whereas the former are usually due to a Group 2 strain. Routine treatments consisting of intracutaneous injections, twice a week of various dilutions of the toxin are continued for at

least three months. If the reaction is large, i.e., in excess of 8 by 8 cm., if a rise in the temperature occurs or if the patient complains without prompting of nausea, diarrhoea or general malaise, higher dilutions are used.

Toxin therapy has been employed in more than 100 cases of recurrent styes and boils with almost uniformly good results.

Toxin treatment of chronic blepharoconjunctivitis has proved less successful. The results have been most unsatisfactory in blunts and in patients whose subjective complaint of itching and burning has greatly exceeded the objective findings. It is possible that some of these patients had inclusion blepharitis.

In a few cases of chronic sinusitis apparently due to staphylococci and sometimes associated with ocular disturbances the toxin has yielded sufficiently favorable results to warrant further trial.

Passive immunization has not received a sufficient trial in ophthalmological cases to allow a definite opinion as to its value. However the author cites a case with a positive staphylococcus blood culture and a purulent knee joint in which dramatic improvement followed the intravenous injection of 50 c.c. of plasma from an immunized donor.

The non specific use of toxin combined with lens extract produces a sensitization to lens protein which is followed by a desensitization. There seems to be a synergistic effect. Such a mixture has been used to desensitize 2 patients with a phaco-anaphylactic type of intra ocular inflammation associated with a cutaneous sensitivity to lens extract.

Another non specific use of toxin is its use as a foreign protein to produce a rise in the temperature. It may be employed after a patient no longer responds to milk or typhoid vaccine and produces its effects without intravenous injection. With the exception of one possibly unfavorable result it has been used without deleterious effects. The value of staphylococcus antitoxin as a therapeutic agent remains to be determined. COWARD S. PLATT, M.D.

#### Barkan O. A New Operation for Chronic Glaucoma. *Am J Ophth* 1930 19 951

Whereas in most operations for glaucoma a new pathway is created for the elimination of aqueous—subconjunctivally in iridencleisis, iridotaxis and trephining and suprachoroidally in cyclodialysis—the author attempts by his new operation to re-open the normal passageways from the anterior chamber into the canal of Schlemm.

In a study of glaucoma he used a contact glass a binocular microscope and a Vogt carbon slit lamp for illumination. With this apparatus he was able to perform slit lamp biomicroscopy of the angles of the anterior chamber with perfect ease to recognize and study the details of the corneoscleral trabeculum and sometimes to see the inner wall of the canal of Schlemm better than by any previous method of gonioscopy. From his findings he concluded that in one half of all cases of chronic

non congestive glaucoma the cause of the increase in tension is an obstruction to the outflow of aqueous due to sclerosis of the corneoscleral trabeculum.

Chronic non congestive glaucoma is of 2 types. In Type 1, to which the majority of cases belong the angle is open, there are no adhesions of the iris to the wall, the anterior chamber is not very shallow and there is sclerosis of the corneoscleral trabeculum with or without deposits of pigment, which renders it impervious to aqueous. In Type 2 the anterior chamber is shallow and in contrast to Type 1 dilatation of the pupil causes blockage of the chamber angle with increased tension.

The author has attempted to cure chronic simple glaucoma of Type 1 by opening the canal of Schlemm under direct magnified vision. He employs a specially designed surgical contact glass operating under a magnification of from 2½ to 2 and using a head loupe with a slit lamp for illumination. The temporal limbus is pierced with a specially designed knife passed across the anterior chamber and deliberately inserted into the trabeculum which is in full view on the other side of the anterior chamber. The incision is continued downward and the canal of Schlemm opened for from one fourth to one third of its extent. The knife is then withdrawn usually without loss of aqueous. Subsequent biomicroscopic examination shows that the trabeculum has been divided and that apparently the rent has no tendency to close.

While according to the case reports presented this method has been in use for less than a year, the results so far obtained indicate that it has achieved considerable success. It is believed to be suitable also for certain cases of glaucoma of Type 2. The author emphasizes the necessity for careful pre-operative biomicroscopy.

Among the advantages claimed for the new operation are the absence of danger of late infection of hemorrhage (as the incision can be seen), of prolapse of parts of sudden reduction of the tension and of recurrence of the hypertonism.

WILLIAM A. MANN, JR., M.D.

#### Watkin B. Treatment of Angioma of the Eyelid by Injection of Sclerosing Solutions. *Arch Ophth* 1936 16 574

The author reports 3 cases of angioma of the eyelids which were cured by the injection of a sclerosing solution. He states that this is a simple method of treatment as it does not require complicated equipment. The solution used most frequently was quinine dihydrochloride. From 3 to 7 injections were necessary.

WILLIAM A. MANN, JR., M.D.

#### Benedict W. L. Adenocarcinoma of the Orbit. *Arch Ophth* 1936 16 663

A study of 27 cases of adenocarcinoma of the orbit disclosed that primary tumors of this type are more frequent than secondary tumors, the ratio of the former to the latter being 22:5. In the cases of primary tumor the ratio of mixed tumors to

tumors of the alveolar type is about 2:1. The relative incidence of primary adenocarcinoma of the orbit arising in the lachrymal gland has not been determined, but since it is known that in many cases adenocarcinoma of the orbit does not arise from the lachrymal gland the statement that it arose from the gland should not be made unless such an origin can be definitely proved. The alveolar type of orbital carcinoma develops earlier in life, progresses more rapidly, and is more malignant than the orbital carcinoma of the mixed type.

**Lauber, H.** Treatment of Atrophy of the Optic Nerve. *Arch Ophth*, 1936 16 535

Lauber presents the hypothesis that tabetic atrophy of the optic nerve occurs only when the normal relationship between the intra ocular tension and the blood pressure is altered, the difference between the two being diminished. He states that the same principle applies in glaucoma. In the latter condition the intra ocular tension rises sufficiently to hamper the retinal circulation. The lower the blood pressure the worse the prognosis. Theoretically, raising the blood pressure would relieve the glaucoma, but this is impracticable.

In tabetic optic atrophy there is a reduction of the general blood pressure such that the "normal" intra ocular tension becomes too high in relation to the blood pressure, with resulting impairment of the retinal circulation. While many patients with tabes were found to have no disturbance in the normal relationship between the ocular tension and the blood pressure, in those with optic atrophy such a disturbance was present.

On the basis of these considerations an attempt was made to treat cases of atrophy of the optic nerve. It was found that iodides, mercury, arsenphenamine and other organic preparations of arsenic and bismuth tend to reduce the general blood pressure. This may explain the progress of optic atrophy under ordinary antiluetic treatment.

An attempt was made to raise the general blood pressure by means of strychnine, diet, and hormones and to reduce the intra ocular tension by means of miotics and, in some cases, operation, preferably cyclodialysis. In the majority of 33 cases so treated the results were satisfactory. One advantage of such treatment is that antiluetic treatment can be given simultaneously without a deleterious effect on the nerve.

WILLIAM A. MANN, JR. M.D.

#### EAR

**Malherbe, A.** Far and Parathyroid (Oreille et parathyroïde). *Presse méd. Par*, 1936 44 1484

In 1900 the author described under the name otitis osteo spongiosa, a condition of precocious deafness characterized by osteitis at certain points in the labyrinth of the ear. This condition occurs exclusively in females and begins generally at puberty or shortly thereafter. There is progressive deafness of both ears associated with tinnitus and often with

some disturbance of the genital organs. Not infrequently the symptoms are aggravated following pregnancy and often they are increased temporarily at the menstrual periods.

Malherbe ascribes the osteitis and osteogenesis in the labyrinth to an endocrine disturbance.

Osteitis of the capsule of the labyrinth occurs first at the promontory and then around the facial canal. Fusion of the two then results with bone formation around the fenestra ovale. Three phases are recognized. The first is characterized by a dilatation of the capillaries in the haversian canals with abundant osteoblasts. In the second, osteoclasts appear, enlarge the lacunae, and excavate new channels which permit migration of the cellular elements. The bone assumes a cribriform appearance. In the third, the spongy bone is transformed into sclerotic bone with ankylosis of the stapes in the fenestra ovale.

The author believes that the ossification is due to disturbance of calcium metabolism secondary to insufficient parathyroid secretion, and that the symptoms can be greatly relieved by the administration of parathormone. No proof is given except the results of clinical experience. Four cases are reported.

MAY M. ZIMMERER, M.D.

**Mayer, O., and Fraser, J. S.** Pathological Changes in the Ear in Late Congenital Syphilis. *J. Laryngol & Otol*, 1936 51 683

The authors state that, apart from its connection with keratitis parenchymatosa and dental deformities, ear trouble due to late congenital syphilis is peculiar because it usually develops in apparently normal individuals between the tenth and twentieth years of age, generally females, and because, when once started, the deafness progresses rapidly, in some cases becoming quite pronounced overnight. As a rule there is no pain, but the patient complains of tinnitus and frequently of giddiness.

The tympanic membrane is perfectly normal or slightly infiltrated. The deafness is labyrinthine, but occasionally the middle ear is slightly affected. Functional examination of the labyrinth frequently discloses very peculiar and inexplicable combinations of reactions.

The authors report 5 cases in detail.

JAMES C. BRASWELL, M.D.

**Teed, R. W.** Cholesteatoma Verum Tympani. Its Relationship to the First Epibranchial Placode. *Arch Otolaryngol*, 1936, 24 455

As disproving the theory that cholesteatoma of the tympanum is always associated with infection, the author cites 4 groups of cases in which there was little doubt of the congenital origin of the condition. On the basis of 20 additional cases cited from the literature he concludes that primary cholesteatoma is best distinguished from secondary cholesteatoma by means of the history and examination. He then reviews the relationship between the first pharyngeal pouch and the first epibranchial placode in fish, amphibia, birds and mammals and discusses a



similar relationship in man. He deduces that, under normal conditions epidermal cells are present in the dorsolateral pole of the tympanum and become transformed into epithelial cells. Occasionally, however, they retain their ectodermal quality and produce skin and the resulting desquamation forms a cholesteatoma.

JAMES C. BRASWELL, M.D.

Fraser, J. S. and Halliday, G. C. A Report upon 891 Consecutive Cases of Acute Middle Ear Suppuration and Mastoiditis with Intracranial Complications in 139 Cases During the Period 1920-34. *J. Laryngol. & Otol.* 1935 51 619.

During the fifteen year period from 1920 to 1934, 891 patients with otitis media who were admitted to the Edinburgh Royal Infirmary were subjected to mastoidectomy. Sixty of them died and nearly 15 per cent developed intracranial complications. Of the latter 6 per cent died. In at least 46 per cent of the cases the otitis media followed an infection of the upper respiratory tract; in 11 cases the removal of tonsils and adenoids and in 9 an operative procedure on the noses and sinuses.

The indications for the mastoidectomy were the usual ones—pain, swelling, tenderness and a profuse discharge associated with headache and vertigo.

The cellular or pneumatic mastoid was found in 93.5 per cent of the cases and a subperiosteal abscess in 15 per cent. The sinus wall was thickened in 2.5 per cent and injured in 3.7 per cent. There were 6 cases of Bezold abscess and 3 of zygomatic abscess.

Bacteriological study revealed hemolytic streptococci in 72.4 per cent of the cases, non-hemolytic streptococci in 4 per cent and pneumococci in 18 per cent.

The cases of intracranial complications resulting in recovery were 16 of sinus thrombosis, 32 of extradural perisinus abscess and 6 of extradural abscess in the posterior fossa. There were no cerebellar abscesses but meningitis was present in 5 cases.

Of the cases of complications resulting in death 33 per cent were cases of meningitis and 17 per cent cases of septicemia.

JOHN F. DELRY, M.D.

#### MOUTH

Ahlbom, H. E. Anemia and Dysphagia—the Plummer Vinson Syndrome—in Women with Cancer of the Mouth and Throat (Ueber Anämie und Dysphagie—Plummer Vinsonsches Syndrom—bei Frauen mit Krebs im Mund Rachen und Schlund). *Nord med. Tidsskr.* 1935 p. 171.

Plummer's first observations on the syndrome designated later, in a large series of publications by Anglo-Saxon writers as the Plummer Vinson syndrome, were reported in 1914. In the northern countries attention was first called to the condition in 1933, when Zetterquist reviewed the observations which had been published up to that time.

The author cites only the publications of Zetterquist (Dysphagia and Anemia—the Plummer Vinson

Syndrome. *Nord med. Tidsskr.* 1933, 6 956), Suzmann (The Syndrome of Anemia, Glossitis and Dysphagia. *Arch. Int. Med.* 1933, 51 1), and McGibbon (The Esophageal Lesions Encountered in Cases of Dysphagia with Anemia. *J. Laryngol. & Otol.* 1935 50 329).

In addition to the characteristic anemia and dysphagia, atrophic changes of the mucous membrane in the mouth, mesopharynx and hypopharynx, and esophagus, and signs of achylous anemia have been observed. After reading the cited article by Zetterquist, the author subjected all of his female patients with squamous celled epithelioma of the mouth and throat to systematic investigation. He found that in 1935 about 60 per cent of his female patients with this condition gave a history of symptoms characteristic of the Plummer Vinson syndrome. He now believes that he will be able to prove that there is a definite relationship between the Plummer Vinson syndrome and cancer of the mouth and throat. In control investigations on women with cancer of the breast the Plummer Vinson syndrome was never observed.

Ahlbom believes that the mucous membrane changes which come on quite gradually must be regarded as predisposing factors in the origin of the cancer. However, the Plummer Vinson syndrome is seen relatively seldom in patients with cancer who are under observation and treatment. Most of the writers believe that squamous celled epithelioma of the mouth and throat is a typical irritation cancer in the sense in which that term was used by Virchow. Etiologic factors are syphilis, misuse of tobacco, poor teeth and ill fitting prostheses.

In most countries 90 per cent of cancers of the mouth occur in men. Cancers of the throat and esophagus are also more frequent in men than women. On the other hand 80 per cent of cancers of the lower part of the hypopharynx (postcricoid carcinomas) occur in women. In Sweden 70 per cent of mouth and throat cancers occur in men and 30 per cent in women. Their frequency in women is explained by the fact that in certain parts of Sweden many women smoke pipes. Both the absolute and the relative frequency of the Plummer Vinson syndrome are highest in cases of postcricoid (hypopharynx) cancer. Recognition of this syndrome is of the greatest importance for the early diagnosis of cancer. An increased tendency toward the development of cancer should be borne in mind also in the examination of cases of simple achylous anemia with stomatitis and glossitis.

(GERLACH) ROBERT H. ILY, M.D.

#### PHARYNX

Schroeder, R. Some Remarks on Suppuration in the Parapharyngeal Space. *J. Laryngol. & Otol.* 1936 52 631.

The author reports cases of suppuration in the parapharyngeal space due to tonsillar or peritonsillar inflammation.

He calls attention to the fact that the deep cervical fascia subdivides the neck into compartments which limit the spread of pus. Most important is the central or visceral space.

Suppurations occur in the paralaryngeal space as the result of (1) direct propagation, and (2) glandular inflammation.

They may be divided into 2 main groups, the anterior and the posterior. In each group 2 types are distinguished. In the anterior group these are (1) pterygoid pharyngeal abscesses, and (2) anterior-inferior abscesses passing down to the submaxillary and submental region. The posterior group includes (1) posterior superior abscesses which pass medially to the styloid group of muscles, appear in the suboccipital region and from there pass down to the posterior triangle of the neck, and (2) posterior-inferior abscesses which pass down along the sheath of the vessels of the neck. In addition to these 4 types there are transition forms.

Of 12 pterygoid pharyngeal abscesses, 11 were caused by a break through the wall of a tonsillar abscess. The clinical picture of such abscesses is characterized by tonsillar swelling, especially of the anterior pillar, edema of the arytenoid and epiglottis, pronounced trismus, and glottic swelling in the carotid triangle. The treatment indicated is operation, with tonsillectomy and dilatation of the fistula.

In abscesses of the posterior superior region the break occurs so far back in the tonsillar bed that the pus forms in the hindmost part of the retromandibular space. This is a rare type and often fatal. The treatment is surgical. Care must be taken to avoid injuring the large vessels.

In cases of abscesses which are caused by suppuration of lymph glands in the posterior inferior paralaryngeal space there is danger that the suppuration may pass into the mediastinum.

JOSEF F. DELEN, M.D.

## NECK

McClintock, J. C. Lesions of the Thyroglossal Tract. *Arch. Surg.* 1936 33 890.

The thyroid develops along a route extending from the base of the tongue down to the usual site of the gland. Aberrant thyroid tissue may be found anywhere along this course, but is most frequent below the hyoid bone. It occurs usually in the form of cysts. Spontaneously or following surgery, sinuses or fistulas may develop.

The differentiation between thyroglossal cyst and thyroid adenoma is not always easy. If suppuration occurs preliminary drainage may be necessary. Strunk advocated removal of the whole trunk, including the middle of the hyoid bone and the core of the tongue. The author found this procedure unnecessary in his 9 cases and believes it should be reserved for cases in which the pathological changes extend above the hyoid bone.

FRED S. MODERN, M.D.

Thompson, B. C. Cervical Gland Tuberculosis. The Case Against Surgery. *Brit. M. J.*, 1936, 2 584.

Conservatism is becoming more general in the treatment of cervical gland tuberculosis, radical gland resection being reserved for localized glands in the upper deep cervical group, which are presumably infected by the nasopharyngeal route. The author believes that resection of tuberculous lymph nodes of the neck is not sound because it is impossible to decide where the disease ends and normal glands begin. In cases in which the tonsils and adenoids are also removed, the lymphatic channels between these lymphoid structures and the lymph glands of the neck are not extirpated. The reported incidence of recurrence following extirpation of the cervical glands of the neck is high, approximately 25 per cent, and the author believes it would be found to be much higher if the patients were kept under prolonged observation.

Thompson has observed 44 cases subsequent to operation. In 39, the tonsillar group of glands alone were involved, in 2, the submaxillary glands, and in 3, the glands in the posterior triangle. Nine patients had more than 1 operation. Four of these had 2 and 5 had 3 operations. Of 53 cases in which a radical operation was performed a gross palpable local recurrence occurred in 50 (91 per cent). In 38, the recurrence became apparent within three months after the operation in 3 within nine months and in 6, within five years. Eighteen (50 per cent) of 36 patients observed immediately after operation had a persistent discharging sinus which, according to the author, is evidence of residual infection.

The presence of tuberculous glands of the neck is not particularly dangerous. With regard to the possibility of the development of pulmonary tuberculosis from the cervical infection there is considerable difference of opinion. Some believe that cervical gland ulcer infections immunize against systemic infection. In the author's opinion, partial excision of involved glands does not increase resistance to the infection but increases the disease in other glands.

Tuberculous glands which are not operated upon shrink, undergo fibrosis, and become calcified, or break down, discharge externally, and ultimately heal. To determine the cosmetic results, Thompson compared 43 cases in which tuberculous cervical glands liquefied and broke down spontaneously because of neglect or refusal of treatment in the early stages with 43 cases in which surgical extirpation was done. Good results were obtained in 30 per cent of the former group and 21 per cent of the latter, moderately good results in 35 per cent of the former and 30 per cent of the latter, and poor results in 35 per cent of the former and 49 per cent of the latter. Thompson therefore concludes that spontaneous rupture of the gland gives better results than surgical extirpation. The routine which he favors is as follows.

In the early stages syrup of ferric iodide is given by mouth. When paradenitis occurs without soften-

ing tuberculin is given by subcutaneous injection. When a cold abscess has formed, either aspiration or incision is done.

In conclusion Thompson says that conservative treatment is of advantage also because it is almost always ambulatory. ALTON OCHSNER, MD.

**Wallis A. E. Chronic Thyroiditis. A Comparative Analysis of 100 Cases. *Arch Surg* 1936 33 545**

Wallis analyzes 100 cases of thyroiditis which were observed in De Quervain's clinic, Berne, Switzerland.

Clinically they fell into 3 groups. In those of the first group there were no clinical symptoms and the subjective symptom was slight dyspnea. In those of the second group there were suggestive clinical symptoms such as swelling, tenderness and local or radiating pain and subjectively dysphagia and dyspnea were present to a mild degree. The thyroid enlargement was diffuse. In those of the third group there was hyperthyroidism. The basal metabolic rate ranged from +18 to +44%. Several of the patients complained of loss of weight, tremor and palpitation. The thyroid enlargement was nodular.

In 14 cases the condition could be traced to infection and in 14 to iodine. Eighty-five per cent of the patients were women. The age distribution was fairly even from the second to the sixth decade. None of the patients was under ten years of age and only 1 was over sixty years. Seventy-six per cent had had previous enlargement of the thyroid.

The prognosis was considered good in every case. The treatment was uniformly surgical. Lymphocytes were found in all of the resected specimens, plasma cells in 53 per cent and giant cells of the foreign body type in 13 per cent. In all of the cases the connective tissue was increased and in 76 per cent there was hyaline degeneration. Riedel's struma was not observed. FRED S. MODERN, MD.

**Thomas H. M. Jr. and Woods A. C. Progressive Exophthalmos Following Thyroidectomy. *Bull Johns Hopkins Hosp* Balt 1936 59 99**

As a rule exophthalmos accompanies and parallels hyperthyroidism but in some cases is entirely absent. After adequate surgical treatment of the thyroid gland it usually disappears or diminishes but in some cases remains unchanged and in a small group may appear or increase progressively although the other symptoms are relieved.

The authors report 15 cases of progressive exophthalmos following thyroidectomy. Eleven of the patients were males. The ages ranged from twenty-four to sixty years and averaged thirty-nine years. The exophthalmos began to progress from ten days to two years after the operation. In 7 cases paresis or paralysis of the extra-ocular muscles occurred. In 2 there was postoperative myxedema but in the others the metabolic rate was normal. Thyroid given in 5 cases and Lugol's solution in 2 were without effect. In the cases of 3 patients the exophthalmos became so marked that tarsorrhaphy was performed to protect the cornea. X-ray treatment is being given to these patients and has possibly resulted in some improvement. Two severe cases have shown improvement without treatment.

In 1 case the exophthalmos was so fulminating that enucleation of the eyes was done but after this the orbital contents continued to hypertrophy and finally they bulged between the eyelids. Pathologic examination of the excised tissue showed no tumor cells, only normal connective tissue and fat. In the conjunctiva there was round cell infiltration.

In 1 case a modified Naffziger operation was performed. In the extra-ocular muscles degenerative and infiltrative changes were found. In 2 cases the orbital contents were under definite pressure. In 3 the muscles showed large islands of round cells.

FRED S. MODERN, MD.

# SURGERY OF THE NERVOUS SYSTEM

## BRAIN AND ITS COVERINGS, CRANIAL NERVES

Woodhall, B. Acute Cerebral Injuries Analysis of Temperature, Pulse, and Respiration Curves  
*Arch Surg*, 1936, 33 560

In an effort to obtain a clinical and physiological basis for the classification, diagnosis, and therapy of acute cerebral injuries, the author made a study of 300 consecutive patients with such injuries. He classifies the injuries as follows:

**Type 1** Concussion, either with or without alteration of the structure of the skull. This condition occurred in 213 of the 300 patients studied. It is characterized by an initial loss of consciousness lasting only a few minutes, which is followed by restoration of complete consciousness or a varying period of drowsiness. The temperature rises slightly, perhaps to 101 degrees F., and then slowly declines to normal within from one to three days. The pulse rate curve closely follows the temperature curve, rising steadily with it after an initial irregularity and falling to normal in the same length of time. The respirations are normal or show a slight but regular retardation.

**Type 2** Injuries characterized by the appearance of either early or late bradycardia associated with a slight and persistent rise in the temperature rarely higher than 101 degrees F., and sometimes by variations in the respiratory rate from the normal. The initial loss of consciousness is usually prolonged. After an initial rise, the slow, heavy, pounding pulse may develop early or, as pressure increases (as, for example, from an extradural hematoma), may develop late. The temperature becomes normal when and if the bradycardia ceases. Persistent regular bradycardia may be considered evidence of compensated intracerebral pressure. The earliest irregularity in the bradycardia, the slightest rise in the temperature, or the briefest deepening in the state of consciousness are warning signals that the limits of compensation have been reached. Injuries of this type occurred in 36 of the patients studied. Injuries of Types 2 and 3 are the most amenable to surgical intervention.

**Type 3** Injuries characterized by a high unremitting fever of from 102 to 103 degrees F. with a corresponding or somewhat less marked tachycardia and evidence of profound disturbance of the state of consciousness. The respiratory rate begins to show a decided alteration from the normal. Injuries of this type occurred in 24 of the patients studied by the author.

**Type 4** Injuries so severe that no procedure is successful in nullifying the effects of intracerebral pressure. Such injuries are clearly signaled by immediate and lasting coma, a rapid rise in the pulse rate and temperature, and a respiratory rate

that approaches the Cheyne Stokes type. Injuries of this type occurred in 27 of the cases studied. The mortality was 100 per cent whether surgical intervention was attempted or not.

All patients with injuries of Type 1 and a certain diminishing percentage of those with injuries of Type 2 and 3 progress satisfactorily without operation. A small number die because of complications. A much larger number of patients with injuries of Types 2 and 3 require operative intervention. A definite percentage die whether they are operated on or not.

Proper early treatment of these cases is most important. Complete rest is essential. No fluid should be given by mouth. The supine position with the head elevated and turned to one side, should be maintained. Severe shock is treated in the usual manner, but harsh stimulants should be avoided in the presence of hidden bleeding. No morphine should be given. Except in cases of extradural and subdural hemorrhage, operation should be delayed until spontaneous bleeding has ceased, approximately six hours.

SAMUEL KAHN, M D

Parker, W H, and Lehman, E P. Studies in Brain Injury Increased Cerebrospinal Fluid Pressure from the Blood in the Cerebrospinal Fluid.  
*Ann Surg*, 1936 104 492

The authors carried out a group of experiments to study the changes in the cerebrospinal fluid pressure and the anatomical changes following a standard laceration of the brain. In another group of experiments they replaced measured quantities of cerebrospinal fluid with equal quantities of blood and its separate constituents.

They found that following experimental laceration of the brain in dogs the cerebrospinal fluid pressure varied directly with the amount of blood that escaped into the subarachnoid space and not with the amount of bleeding within the cerebrum. There was a rise in the cerebrospinal fluid pressure following the introduction of a solution of hemoglobin, defibrinated blood, and blood serum into the cisterna magna regardless of the previous withdrawal of an equal quantity of cerebrospinal fluid. The introduction of twice the quantity of blood serum approximately doubled the percentage rise of the cerebrospinal fluid pressure. The introduction of washed red cells did not cause an increase in the cerebrospinal fluid pressure over a period as long as 5 hours. Following the administration of hemolyzed red blood cells the cerebrospinal fluid pressure rose.

Microscopic study of the brain following partial replacement of the cerebrospinal fluid by blood and its separate constituents showed inflammatory changes which were not correlated with the cere

cerebrospinal fluid pressure changes. Apparently there was less meningeal inflammation following the introduction of serum than following the introduction of whole blood or washed red cells.

The authors believe that the changes described were probably the result of an increase of osmotic pressure of the cerebrospinal fluid due to the introduction of blood proteins and that the phenomena of osmosis must be considered as operative in the appearance of blood in the cerebrospinal fluid.

ROBERT ZOLLINGER, M.D.

### PERIPHERAL NERVES

Raspall J. T. Six Cases of Radial Nerve Paralysis of Traumatic Origin. Treatment and Results (Seis casos de parálisis radial de origen traumático. Tratamiento y resultados). *Ciruj. ortop. y traumátol.* 1937, 1, 39.

The 6 cases reported by the author may be summarized briefly as follows:

Case 1. On open reduction of a fracture of the humerus the radial nerve was found enmeshed in the bone fragments. Following the reduction the nerve was placed in an artificial bed in the triceps muscle and a plaster cast was applied. When the cast was removed on the thirty-eighth day paralysis was present. Daily electrotherapy caused no improvement until the seventh month when the muscles responded to the galvanic current. At the end of twelve months the paralysis was found completely cured.

Case 2. This was a case of severe contusion of the posterior aspect of the arm with immediate paralysis of the radial nerve and infiltration of the soft tissues. As the nerve had evidently not been severed operation was not performed. Electrotherapy was instituted immediately and by the sixty-seventh day beginning stimulation by the faradic current was noted. After four and one half months active movement was satisfactory.

Case 3. Following the open reduction of a fracture of the humerus the radial nerve was sutured end to end and a cast applied. After about one year of electrotherapy dorsal flexion of the hand is almost normal.

Case 4. In this case a fracture of the humerus was followed by immediate paralysis of the hand. Dorsal flexion of the hand and extension of the fingers were impossible. The patient was seen by the author forty days after the accident causing the fracture. At operation the radial nerve was sutured end to end and placed in a new bed in the triceps muscle. After six months of almost daily electrotherapy function was restored.

Case 5. Degeneration of the radial nerve followed a fracture of the humerus. At operation, the nerve was freed and placed in a new bed in the triceps muscle. The end result was not satisfactory in spite of prolonged electrotherapy. Transplantation of tendons at a second operation gave satisfactory results.

Case 6. The radial nerve was enmeshed in callus formation following a fracture of the humerus. The nerve was freed and placed in a new bed in the triceps muscle. After fourteen months of electrotherapy the patient is considered cured.

MARIO A. CASTALLO, M.D.

Cutler E. C. and Gross R. E. Neurofibroma and Neurofibrosarcoma of the Peripheral Nerves Unassociated with Recklinghausen's Disease. A Report of 25 Cases. *Arch. Surg.* 1936, 33, 133.

The authors report 25 cases of 3 distinct but related peripheral nerve tumors—simple neurofibroma (perineural fibroblastoma), malignant neurofibroma and neurofibrosarcoma (neurogenic sarcoma)—giving the pathological findings and the follow-up histories.

The typical gross and the microscopic appearance of each type of tumor are described in detail and differentiated from those of the normal nerve sheath, the other types of tumor and the Recklinghausen lesion.

The simple neurofibroma is described as a slowly growing encapsulated firm mass which usually does not become incorporated in the nerve proper and can usually be peeled away from the trunk of the nerve. Cystic and myxomatous degeneration and hyalinization are common. Histologically the tumor resembles an acoustic neuroma showing whorls and bands of elongated nuclei lined up and closely packed. Mitotic figures are rare and the hyperchromatic nuclei are of a mature type.

Malignant neurofibromas are so named because they grow more rapidly than the simple neurofibromas; they often incorporate the nerve trunk in their mass and they show a strong tendency to recur locally. The nuclei in the cells are plump and more immature in appearance and occasional mitotic figures may be seen. Malignant neurofibromas have not been known to form metastases.

As a rule neurofibrosarcomas are recognized easily. They usually have no capsule, tend to show sudden spurts of rapid growth and are definitely invasive. Invasion of blood vessels is particularly common. As they metastasize by the blood stream rather than by the lymphatics the regional lymphatics will give no clue to spread of the tumor and x-ray studies of the lungs should always be made. When encapsulated these tumors may be very misleading. Therefore in all cases of peripheral nerve tumor the history of the growth of the tumor must be obtained and a thorough search made for metastases. Neurofibrosarcomas are bloody on cut section granular and friable. They are highly cellular and their cells show all stages of growth. Giant cells may be present and mitotic figures are frequent. Tumors of this type are particularly dangerous as both their gross and microscopic appearance may be misleading. Under the microscope certain areas may show palisade and whorl formations similar to those in the simple neurofibromas.

These 3 types of tumors are found most frequently in the arms, the lower two thirds of the legs, the neck, the supraclavicular fossæ, the buttocks, the stomach, and the tongue. They occur most often in early or middle adult life. Sex does not seem to be a factor in their occurrence.

In 1 of the authors' cases a tumor weighing 2,200 gm. was removed from the upper arm of a man fifty six years of age. The neoplasm was encapsulated and arose from the median nerve which was lanced out over it. Parts of the tumor were studied microscopically and it was believed to be benign. It had grown slowly over a period of twenty years, but during the five months preceding operation it had more than doubled in size. Four months after the operation the patient returned with an enormous recurrent mass at the same site which seemed to be fairly well demarcated and not invasive. At this time there was a suspicious nodule in the left lung, and a few months later (eleven months after the first operation), the lungs showed extensive sarcomatous destruction. Sections of the second tumor showed a high grade of malignancy, and the patient died just a year after the first operation.

The authors believe that the only treatment for these tumors is surgery, and that radium and x ray irradiation are merely palliative in the terminal stages. When there is doubt as to whether the tumor is a simple or malignant neurofibroma judgment is necessary to determine whether the neoplasm should be dissected from the nerve or the nerve sectioned and removed with the tumor and then sutured end to end. If there is any reason to suspect that the tumor is malignant, section of the nerve is the treatment of choice. Highly malignant neurofibrosarcomas, definitely diagnosed as such, must be treated in the same way as periosteal sarcomas, that is, by amputation if the findings demand it and no signs of metastases have appeared.

JOHN MARTIN, M.D.

Bentley, F. H., and Hill, M. Nerve Grafting. *Brit J Surg*, 1936, 24, 368.

Opinions as to the value of nerve grafts in peripheral nerve surgery vary widely. In an effort to verify the conclusions of Duell and Ballance, the authors carried out experiments on cats. Duell and Ballance claimed that a degenerated nerve graft has several advantages over a fresh one. In explaining its advantages Ballance implied that:

1 The products of wallerian degeneration exert a neurotropic attraction on new-growing nerve fibers.

2 The old neurilemmal tubes persist and allow new nerve fibers to traverse them, and the presence of the products of wallerian degeneration forms a barrier to the downgrowth of these fibers.

3 The fresh nerve graft provokes a foreign body reaction while the degenerated nerve graft does not.

The authors' experiments disproved these deductions rather conclusively and showed that the results after the grafting of fresh and degenerated nerve grafts are indistinguishable. They demonstrated also that a successful result depends upon the accurate approximation of the nerve and a graft of equal caliber to reduce the amount of scar tissue at the suture lines. Nerve gaps 3 cm. in length have been satisfactorily bridged with homeo nerve grafts. The authors believe that the findings of Duell and Ballance which favor the use of degenerated nerve grafts were due to the physical properties of such grafts. While fresh nerve is soft and friable, degenerated nerve becomes firm and its cut end tends to remain circular and patent. Satisfactory approximation of graft and nerve can therefore be obtained more readily with a degenerated graft than with a fresh one and this advantage would no doubt be particularly valuable in grafting of the facial nerve in its bony groove where the ends of the graft and nerve are simply laid against each other and coaptation by sutures is impossible.

ROBERT ZOLLINGER, M.D.

# SURGERY OF THE THORAX

## CHEST WALL AND BREAST

Speed K. Tumors of the Chest Wall *Ann Surg*, 1936 104 330

In reporting a number of cases of tumor of the chest wall the author cites the classification of such neoplasms by Zininger: (1) tumors arising from the deep structures of the thoracic wall which are partly intrathoracic (2) tumors arising from the more superficial structures of the thoracic wall but apparently fixed to the deeper structures and (3) tumors arising within the thorax and presenting through the thoracic wall.

Lipomas and hemangiomas of the chest wall may present great difficulty in diagnosis and treatment although they may be quite benign. Thoracic lipomas may be of the hour glass type. They may be situated in the anterosuperior mediastinum and present in the root of the neck or may be completely intrathoracic. Most tumors of the thoracic wall are chondrosarcomas and many of them undergo myxomatous degeneration. They grow by infiltration and metastasize late. All are potentially malignant. The differential diagnosis must exclude tuberculosis and syphilis of the ribs, multiple myeloma and non-specific necrosis of the bones of the thorax.

Speed comments on the dangers of some of the operative complications such as open pneumothorax and uncontrollable hemorrhage.

The article is concluded with the report of 6 cases operated upon by the author.

JOHN H. GARLOCK, M.D.

Fejér E. Tertiary Syphilis of the Breast (Tertiäre Syphilis der Mamma) *Bergsgy & emle* 1936 44

Tertiary syphilis of the breast appears as a diffuse mastitis or a gummatous infiltration and may be confused with carcinoma. In the differential diagnosis a history of syphilis, a positive Wassermann reaction and a positive intracutaneous luetic reaction (Quotest) are of importance. In syphilis the regional lymph nodes are usually not infiltrated and the changes are often bilateral or multiple. The author reports a case.

His patient was a man fifty-nine years old who gave a history of chancre occurring thirty-five years previously. Inunction therapy was given for a short time and he had had no further symptoms. Two years before he consulted the author his left breast had become swollen and had been treated by roentgen irradiation. When the author saw him there were numerous areas of infiltration and ulceration on the breast. One area of infiltration was about the size of a fist and below it was an ulcer as large as the palm of a hand.

The treatment consisted in the administration of potassium iodide and neobismosalan.

The ulcers healed with scars and the formation of a fistula. Removal of bone sequestra from the third rib was followed by inward penetration of the suppurative process which resulted in pneumonia, empyema and death.

At autopsy, endarteritis meso-arteritis, chronic fibrous syphilitic aortitis, empyema, pneumonia, parenchymatous degeneration of the kidneys and diffuse interstitial syphilitic hepatitis were found.  
(F. G. L.) J. DANIEL WILLEMS, M.D.

Taylor H. C. Jr. The Evidence of an Endocrine Factor in the Etiology of Mammary Tumors  
*Am J Cancer* 1936 27 525

The theory of an endocrine origin of breast tumors is based on the hypothesis that the stimuli to normal growth when active in increased intensity or applied over excessive or irregular periods of time may result in atypical forms of proliferation. The dependence of the normal growth and development of the female mammary gland upon the ovary has been demonstrated by castration and implantation experiments. It has been indicated also by injection of the estrogenic hormone into laboratory animals. When certain compounds are used an extension of the duct system with little development of acini occurs, whereas when others are employed the appearance of new acini is the prominent change. Estrone benzoate injected subcutaneously into male mice results not only in stunting of development of the mammary duct system as compared with the development induced by small daily injections of theelin, but also in a growth of well formed lobules of alveolar tissue. When corpus luteum hormone has been given to castrated male rabbits after the estrus-producing hormone has produced only duct development, the formation of true acini has been observed. Breast development up to the stage of lactation in the complete absence of luteal influence has been observed in male animals treated with estrogenic hormone. The special relations of the corpus luteum to the breast must therefore be regarded as still undetermined. The hormone of the anterior lobe of the pituitary gland is the active stimulus to lactation. However, before its functional stimulus on the mammary glands can be effective the parenchyma of the latter must be prepared by the developmental stimulus of estrin. A specific lactogenic hormone called prolactin has been isolated from the anterior lobe of the pituitary gland.

In the human being the swelling and secretion of the breasts of the newborn coincide with a demonstrable excretion of large quantities of estrin and prolactin. In childhood the blood and urinary concentrations of estrogenic hormone are apparently low. The breasts and uterus are smaller at the second year of age than at birth. There have been

numerous reports of precocious breast development in the presence of certain specific ovarian neoplasms. In cases of granulosa cell tumor an excessive excretion of estrin, and in cases of teratoma an excessive excretion of prolactin has been demonstrated. Breast development begins at the tenth year and progresses to a considerable extent before the first menstrual period. With regular recurrence of the follicle corpus luteum cycle, as evidenced by the menstrual periods, a condition of relative stability in the mammary gland is reached. The development attained at puberty varies greatly in different individuals, the glandular structures being therefore of varying complexity and probably also of varying physiological potentiality. Such differences are perhaps the basis of variations in the later responses of the breast to the stimuli of the menstrual cycle and pregnancy and perhaps to the factors favoring abnormal growth. The cyclical changes in the blood concentration and the rates of urinary excretion of the hormones which theoretically may be responsible for breast reactions have been carefully studied. The days of breast enlargement, tenderness and hyperemia fall in the premenstrual part of the cycle and therefore correspond to a high level of estrin and presumably of corpus luteum hormone in the blood stream.

The relation of the pregnancy hypertrophy of the human breast to the hormones is easily demonstrable. An anterior-pituitary like hormone appears in the urine within two weeks after conception, increases in concentration until about the fourth month of pregnancy, and then gradually decreases to term. Estrin in large amounts appears somewhat later and its concentration in the blood and urine increases slowly until term. During the first three to four months the corpus luteum of pregnancy is present, but thereafter it regresses. Under the influence of these 3 hormones the epithelium of the breast undergoes enormous proliferation. During the later months of pregnancy a little secretion of a special type occurs, but no true lactation.

During the first few days after delivery the prolactin and estrin disappear from the blood and urine and lactation begins. As excessive amounts of estrogenic or gonadotropic hormone are not detectable in the blood at this time, lactation in women appears to be favored by a sudden drop in the estrin concentration. The importance to the continuance of lactation of the nervous stimulus produced by the act of suckling is obvious.

The end of menstrual life is accompanied by disappearance of estrin from the blood and urine and a definite increase in the activity of the anterior lobe of the pituitary gland with more or less rapid shrinkage of the breasts and disappearance of their glandular elements.

The similarity of the physiology of the breast to that of the uterus suggests that much help in the study of mammary neoplasms might be obtained from the findings of investigations with regard to the causes of tumors of the female pelvis. Hyperplasia of the endometrium has been attributed to a

persistent ovarian follicle and absence of corpus luteum. High estrin values in the blood and urine have been demonstrated in women with this condition, and the hyperplasia is invariably cured by removal or irradiation of the ovaries. Fibromyomas occur only in the years of ovarian activity and diminish in size after the menopause, whether it is normal, surgical, or induced by irradiation.

The term "chronic mastitis" is used to designate the diffuse neoplastic processes occurring in the human breast. Among such processes have been included various forms of epithelial proliferation, cyst formation, certain inflammatory processes, and diffuse fibrosis. Several investigators have reported the production of chronic cystic mastitis in laboratory animals by the continued injection of various hormones.

The majority of women with chronic mastitis have a normal menstrual cycle, but there are many with a prolonged menstrual interval and a decrease in the amount of flow. In 65 women with chronic mastitis who were subjected to incidental gynecological operations the incidence of follicle cysts in the ovaries was high. However the significance of this finding is open to question on account of the general frequency of such cysts. In 31 cases it was possible to study sections of the endometrium. In all except 3 the endometrium was normal. In 2 of the 3 exceptions a suggestion of glandular hyperplasia was present and in 1, carcinoma was discovered.

In the cases of 20 women with chronic mastitis the excretion of estrin in the urine was estimated by the method of Frank. The average rates of excretion differed little from those of the normal controls. Tests for prolactin made by the Zondek and Hatzman Doisy methods showed no excess excretion. Irradiation of the ovaries resulted in a simultaneous diminution in the rate of estrin excretion and the severity of the breast symptoms. The administration of large quantities of estrin resulted in no increase in the severity of the breast symptoms. This clinical study indicates that the occurrence of chronic mastitis requires the presence of an active ovary. Certain factors, including the high incidence of menstrual disorders and cystic ovaries point to an associated ovarian dysfunction in some cases. Up to the present time analysis of the clinical histories and estimations of the estrin and prolactin of the urine have not proved that chronic cystic mastitis is due merely to an excess or lack of the estrogenic or gonadotropic hormone.

Fibro adenoma does not occur before the puberty development of the breast and seldom, if ever begins after the menopause. Therefore ovarian function is essential for the development of such a tumor although it is not necessarily the specific cause. There is some indication that fibro adenomas occur most frequently in women of a special constitutional type, namely, nulliparous women with relatively undeveloped pelvic organs and mammary glands. During pregnancy there is a marked hyper



trophy of the epithelium to form the so called lactating adenoma of the breast

It has been shown experimentally that carcinoma is related to ovarian function. In tumor bearing mice the incidence of carcinoma could be lowered by castration or prevention of breeding. In male mice tumors have developed following the transplantation of ovaries and also following injections of estrogenic substances. In experiments on a strain of mice in which 72 per cent of the females but none of the males developed spontaneous mammary cancer Lacassagne produced mammary cancer in all of the 5 males and in 5 of the 7 females by weekly injections of estrin. Mammary cancer has been caused also by the local application of ketohydrotestosterone and the injection of benzogonesterol. Repeated pregnancies may increase the incidence of cancer in cancer bearing mice. Clinically one third of women with cancer are in the period of mature ovarian function, a third in the period from five years before to five years after the menopause and a third beyond five years after termination of the menses. Carcinoma is more common in nulliparous women.

In an investigation of the nursing histories of 349 women with breast carcinoma it was found that 72 per cent were nursed for at least six months. Of the remainder the great majority were not nursed either because their milk supply was inadequate or because they deliberately weaned their infants. Therefore nursing failure in the history of a woman with cancer of the breast may be significant. It may be evidence of the existence at some time of an inflammatory state due to stasis of secretions or of a physiological deficiency possibly itself connected with an inherent predisposition toward neoplastic growth.

In a study of the menstrual patterns of women with breast cancer a possibly significant finding was a change in the characteristics of the periods which frequently made its appearance shortly before discovery of the tumor.

When carcinoma of the breast is associated with a cancer of the uterus the latter is usually an adenocarcinoma of the endometrium, another tissue subject to the ovarian function rather than a squamous cancer of the cervix.

In contrast to the meager evidence of an endocrine cause of human breast cancer the effect of the ovarian hormone on already established carcinoma is more or less generally accepted. The extremely unfavorable prognosis and rapid growth of cancer of the breast during pregnancy or lactation is well known. About thirty five years ago bilateral oophorectomy as a method of treatment in recurrent breast cancer had a short vogue. In recent years the principle has been revived by the substitution of x ray for surgical castration. In some cases this treatment is followed by spectacular improvement but its beneficial effect when applied to a series of cases may not be statistically apparent.

MANUEL E. LICHTENSTEIN M.D.

Manford S. A. and Linder H. Carcinoma of the Breast in Homologous Twins. *Am J Cancer* 1936, 28, 393.

While it is generally agreed that certain types of cancer may be hereditary in mice proof of the hereditary nature of the disease in man is less satisfactory. Among the factors assumed to be indicative of the hereditary nature of tumors is the occurrence of similar tumors in similar positions in homologous twins. The authors report the occurrence of carcinoma of the left breast in homologous twin sisters ninety-one years of age. Each of the twins had a firm tumor in the left breast which was grossly characteristic of carcinoma and in each of them the tumor had been noticed for about two years. In the case of one of them the clinical diagnosis of carcinoma was confirmed by biopsy. In the case of the other biopsy was refused but the clinical picture was so characteristic as to leave little doubt of the malignant nature of the lesion.

The family history of the patients revealed the occurrence of carcinoma of the left breast in 3 generations.

EARL O. LATIMER M.D.

Vigil E. Aponeurectomy of the Breast. *Técnica de Mierola (La aponeurectomía del seno. Técnica del Profesor Lorenzo Mierola). Bol Inst de Clin Quir Univ de Buenos Aires* 1936, 12, 125.

Vigil states that Mierola's modification of the classical technique for removal of the breast is justified by the following observations:

1. The tendency of neoplasms of the breast to extend only along certain channels.

2. The rarity of metastases in the muscles.

3. The fact that metastases occur most frequently in glands in relation to the site of the breast tumor.

Mierola's technique allows complete dissection of the axillary space with ablation of only the pectoralis minor muscle and without removal of the pectoralis major.

By means of a racquet incision the skin, subcutaneous tissues and the aponeuroses of the various muscles starting with the aponeurosis of the pectoralis major and continuing to and including the axillary space are removed in one piece. The axillary glands and fat are removed and minute dissection of the glands about the nerves and blood vessels is rendered possible by the exposure obtained. Drainage is seldom necessary.

It is claimed that this operation is less mutilating than the Halstead operation and gives just as good results as the latter when performed in suitable cases.

MARIO A. CASTALLO M.D.

#### TRACHEA LUNGS AND PLEURA

Killian H. Schwoerer G. and Schotzky H. Studies on the Pulmonary Circulation (Studien ueber den kleinen Kreislauf). *Deutsche Zeitschr f Chirurg* 1935, 24, 557.

In previous articles the authors reported in agreement with observations made by Tiemann in 1932

that, under various circulatory conditions, the lungs examined macroscopically in perfusion experiments with dyes, show marked variations in the volume of circulating blood whereas, under normal conditions and in artificially induced plethora, nearly all lobes have a nearly equal blood content. In anemia produced experimentally by hemorrhage they noted first a uniform paling of all of the lung tissue. Only when the anemia became severe was there a completely irregular flow of blood through certain parts of the lungs, especially the peripheral areas. The pallor of these parts was due, not to infarcts in the sense of occlusion of the afferent vessel, but to the functional closure and sidetracking of a wedge shaped vascular area.

The authors observed also that in cardiac weakness produced by chloroform and also in the end stages of high grade anemia only the afferent vessels of the lungs, that is the regions of the pulmonary artery, were reached by the dye. The description and discussion of sections of mammalian lungs which had been injected with vital stains are supplemented by numerous illustrations.

From the findings the following conclusions are drawn:

1 The capillary network of the lung can be demonstrated by means of vital stains only when the lobe of the lung is tied off during life since after death it empties into the efferent veins and perhaps also into the right heart.

2 In contrast to former representations regarding the vascular supply of the alveoli, each alveolus has several afferent arteries and several corresponding efferent vessels. Alveolar facets are formed by the crowding together of 2 neighboring alveolar sacs, and interalveolar angles by the juxtaposition of 3 or 4 alveoli of the alveolar tree. In the interalveolar angles lie the main stems of the alveolar vascular tree which maintain the circulation the longest. From these arises the capillary network of the facets and within them lie the efferent veins. The vascular net in the region of an acinus seems to be formed entirely independently of the alveolar sacs.

3 In normal lungs and in experimentally produced plethora blood flows through practically all of the capillaries. In experimental anemia, single capillary regions cease functioning at first in all parts of the lungs. In high grade anemia the peripheral regions no longer receive blood. The capillaries affected are empty of blood, but do not collapse. They contain serum and a few erythrocytes. Frequently the latter are swept into the efferent veins. This cessation of function in certain portions of the alveoli or of larger parts of the lungs can be explained, not by an active mechanism, but only by a purely passive pressure phenomenon. The theory of alternate circulation in certain lung areas by active regulation (valves) is to be rejected. The lung cannot be recognized as a depot for blood.

4 A peripheral zone of pulmonary capillaries extending to about 2 mm beneath the surface is to be distinguished from the capillary network in the interior

of the lung. In the former the capillaries are scanty and apparently are not important for oxidation. The authors' pictures of the capillary network in the interior of the lung agree with the description of the anatomists. The average width of the capillaries and that of the intervening spaces are the diameter of 1 or 2 erythrocytes.

5 The pictures of high grade anemia and of cardiac weakness from chloroform showed gradual changes. In both conditions there are large non-functioning zones. In the former the circulation is greatly reduced, in the latter it is interrupted.

6 These findings show that in cases of heart failure there is not always an overfilling of the pulmonary circuit, but that the opposite may be true.

The article is concluded with a brief review of the literature.

(HEINEMANN GRUEDER) PHILIP SHAPIRO, M.D.

Vallebona, A. Infiltration of the Lung with Iodized Oil After Bronchography—Pneumography Following Bronchography (Infiltrazione iodo oleosa postbroncografica del polmone—pneumografia con seguente broncografia). *Radiol med* 1936 23 756

The author reviews the history of pneumography and bronchography and discusses a result of bronchography that has been noted frequently in recent years—persistence of the iodized oil in the lung tissue for a varying period of time. He reports, with roentgenograms, some of his own cases which showed persistence of the iodized oil varying from slight traces for a short time to dense infiltration for a long time. He states that the picture of the condition is very characteristic and readily recognized.

In the majority of cases in which bronchography is done the iodized oil is quickly eliminated, but in some of them its elimination required months or years. The causes of the delay of elimination are not known. They appear to be very complex.

The stagnation of iodized oil is believed by many to occur only in lungs with pathological changes. However, it has been demonstrated also in normal lungs. As the persistence of a foreign body in the lung tissue may cause pathological changes, diagnosis by bronchography should be limited to cases in which it is strictly indicated and other methods are not sufficient. AUDREY GOSS MORGAN, M.D.

Alexander, J. Some Advances in the Technique of Thoracoplasty. *Ann Surg*, 1936, 104 545

Improvements in the technique of thoracoplasty during the last decade have decreased the operative mortality by half and doubled the incidence of complete closure of tuberculous cavities.

Among the more important technical improvements which have extended the indications for thoracoplasty as well as those for various types of bilateral collapse therapy are: (1) limitation of the resection to 2 or 3 ribs at an operative stage, (2) the removal of greater lengths of ribs, (3) removal of the anterior ends of ribs at a separate operative stage to lessen the suddenness of pulmonary collapse and reduce

dangerous paradoxical movements of the thoracic wall when maximal collapse is necessary. (4) provision for progressive pulmonary collapse by formalization of the periosteum of the ribs to prevent regeneration of ribs posterolaterally. (5) resection of the entire lengths of the vertebral processes and the underlying necks of the ribs at above and below the level of the pulmonary cavity to increase pulmonary collapse in the costovertebral gutter, and (6) removal of the upper ribs first with preservation of the lower ribs for respiratory function when there are no lesions in the lower lung requiring collapse.

The author cites statistics to show the striking improvement that has occurred in the results of thoracoplasty in the last ten years.

FARLEY LUTIMER, M.D.

**Carter B. N.** The Late Results of Thoracoplasty in the Treatment of Pulmonary Tuberculosis. *Ann Surg* 1935 104 52

Carter reports on a series of 103 cases of pulmonary tuberculosis which were treated by thoracoplasty. In by far the greater number complete thoracoplasty was done according to the earlier technique that is the removal of relatively short segments of 7 or more ribs. At least two and one half years have elapsed since the operation in every case and as many as eleven years in some of them.

Fifty-eight of the 103 patients are working and have a negative sputum. 4 have a negative sputum but are unable to work. 5 are able to do some work, but still have a positive sputum. 9 with a positive sputum are completely unable to work, and 27 are dead.

Of the 27 deaths 9 occurred within from two to thirty five days and can be attributed to the operation. The late deaths were nearly all due to some form of tuberculosis. J. DWILL WILKINS, M.D.

**Boland F. H.** Traumatic Surgery of the Lungs and Pleura. *Ann Surg* 1930 104 512

Of 1287 wounds of the chest treated at the Grady Hospital, Atlanta, in the period from 1922 to 1935, 1009 (84 per cent) were penetrating wounds. In addition there were 16 stab wounds of the heart and 1 stab wound of the pericardium which were sutured with recovery in 50 per cent.

The ratio of males to females was 3:1 and the average age of the patients twenty-seven years.

Seven hundred and ninety-nine (79 per cent) of the wounds were stab wounds, 207 (21 per cent) were gunshot wounds, 2 were due to automobile accidents and 1 was due to a fall from a roof.

Pain, weakness and shock were constant symptoms. Cough and hemoptysis were signs of uncertain value, and their absence was not regarded as significant. Hemoptysis is rarely fatal unless one of the large vessels is ruptured or there is a direct communication between a bronchus and a vessel or extensive laceration of a lung which is unable to collapse because of adhesions. Dyspnea was usually present and marked distress in breathing usually

meant pneumothorax or hemothorax. Two characteristic early signs were lagging of the affected side on respiration and moist râles over the area involved. As a rule the pulse and respiratory rates were increased and fever and leucocytosis were present in the cases of hemothorax. There was decreased resonance and diminution of the respiratory sounds until the presence of air caused increased resonance and the presence of fluid caused dullness. Cyanosis was difficult to recognize in these patients.

Hemothorax was diagnosed in 248 (25 per cent) of the cases, pneumothorax in 103 (19 per cent) and hemopneumothorax in 352 (38 per cent). The maximum amount of bloody fluid aspirated at one sitting was 2000 c.c.m. The greatest total amount in a case was 10,000 c.c.m. over a period of five weeks. Dyspnea was always present and often was intense. The temperature rose to as high as 103 degrees F. and subsided after withdrawal of the fluid.

The roentgen evidence consisted of elevation of the diaphragm on the affected side.

Infection was extremely rare. Empyema occurred in 17 cases, pneumonia in 8 and abscess and gangrene in none.

Cellular emphysema was present in 150 (15 per cent) of the cases but did not necessarily indicate penetration.

In the great majority of the cases the treatment was simple. It consisted of sterilization of the wound, debridement if indicated, strapping of the chest, immediate suture of sucking wounds, bed rest and the administration of ample sedatives. Shock was treated in the usual way. Tetanus and gas bacillus antitoxin were given in the majority of the cases and tetanus and gas bacillus infections did not develop. The most serious consequence of thoracic trauma is hemorrhage. As air and fluid in the thoracic cavity act as a tampon to prevent further bleeding, aspiration was never done during the first forty-eight hours unless distressing dyspnea was present. Blood was aspirated in 185 (18 per cent) of the cases and air in 9. Of 15 cases in which the diaphragm was sutured, recovery resulted in 10.

The total number of deaths was 136, a mortality of 23 per cent. Forty-six of the deaths occurred within twenty-four hours after the patients' admission to the hospital. Therefore 90 (9 per cent) were attributable to remediable trauma of the chest.

J. DANIEL WILKINS, M.D.

**Penberthy G. C. and Benson G. D.** A Ten-Year Study of Empyema in Children. *Ann Surg* 1936 104 670

Of 568 cases of pneumonia treated during the years from 1926 to 1936, empyema developed as a complication in 107. The mortality in the latter was 50.3 per cent. There was a definite parallelism between the mortality of pneumonia and that of empyema. Of the 107 patients developing empyema, 365 survived and all but 3 made an excellent clinical recovery.

A uniform procedure of surgical drainage combining the closed and open methods was used. This consisted of trocar cannula catheter insertion under local anesthesia, clamping of the catheter with a hemostat, and aspiration. After from twelve to eighteen days, the catheter was allowed open. Rib resection was necessary in only 15 cases. The Wangenstein method of suction was found a valuable aid in shortening the period of morbidity due to failure of the lung to re-expand after the surgical drainage.

J DANIEL WILLIAMS, M.D.

### ESOPHAGUS AND MEDIASTINUM

Leven, N. I. The Surgical Management of Congenital Atresia of the Esophagus with Tracheo-esophageal Fistula. *J Thorac Surg*, 1936, 6, 30.

In the most common type of atresia of the esophagus there is an upper segment which terminates blindly just above the bifurcation of the trachea. The lower segment has a fistulous communication with the trachea, usually from 0.5 to 1.0 cm. above the bifurcation of the latter, or less frequently, with a bronchus. The upper segment is usually hypertrophied and dilated. Its average length is 3 or 4 cm. As a rule the lower segment of the esophagus at the cardiac end is of normal size, but often it diminishes in caliber toward the communication with the trachea.

The symptoms associated with this lesion are quite characteristic. At birth, the child appears to be well nourished and well developed but has difficulty from large amounts of frothy mucus which fill the mouth and pharynx and drools from the side of the mouth. It takes the breast eagerly, but after a few swallows stops breathing, becomes cyanotic, and regurgitates frothy mucus and feedings through the nose and mouth. It appears as if it would drown but after a period of lifeless relaxation usually recovers and repeats this performance with each subsequent feeding. The average weight loss before death is from 25 to 40 per cent. The upper abdomen is frequently distended because of air in the stomach.

The common type of atresia of the esophagus presents 3 problems: (1) feeding, (2) management of the fistulous communication of the lower segment of the esophagus with the trachea, and (3) care of the blind pouch of the upper esophageal segment.

The most frequent procedure for purposes of feeding is gastrostomy. This in itself may hasten death since food can travel in a retrograde manner through the distal segment of the esophagus and enter the trachea through the fistulous opening. Such regurgitation may occur also after jejunostomy. Legitimate objections are made against ligating the cardia to prevent it.

While it is generally believed that the blind pouch of the upper segment of esophagus is treated best by cervical esophagostomy, the author prefers in intermittent aspiration of the mucus and saliva from the mouth. By this means he delays the stage of the operative procedure.

Leven enters the abdomen through an upper left rectus incision extending to the costal margin. The relatively enlarged liver of the newborn makes the exposure difficult. The stomach is gradually retracted until the cardia is reached. The subdiaphragmatic esophagus and the cardiac end of the stomach are mobilized by blunt dissection. With care in dissection a centimeter of the mediastinal esophagus can be pulled into the abdominal cavity. To aid in the traction a rubber tissue drain is passed under the mobilized esophagus. By depressing the abdominal wall and exerting moderate traction on the rubber tissue drain the cardiac end of the esophagus and the stomach can be brought into the operative wound. The peritoneum and sheath of the rectus muscle are sutured under the exteriorized cardia and esophagus with 2 mattress sutures of chromic catgut. A multiple pursestring type of gastrostomy is then made in the stomach distal to the exteriorized portion. The abdominal wound is closed and a soft rubber catheter placed under the exteriorized portion of the stomach. The ends of the catheter are fastened to the abdominal wall with adhesive tape. By this method an angulation is formed at the cardia, proximal to the gastrostomy. This angulation effectually prevents regurgitation of gastric contents into the lungs.

Because of leakage about the gastrostomy tube and perforation which occur in the exteriorized portion of the stomach, it is advisable to cut across this portion of the stomach and reconstruct the gastrostomy after two or three weeks.

A cervical esophagostomy may be done at a future date and antithoracic esophagoplasty carried out to establish continuity of the gastrointestinal tract. While none of the author's patients survived long enough for the later operations, one infant lived for ninety-eight days and another for fifty-three days.

LARL O. LITMER, M.D.

Decker, H. R. The Diagnosis and Treatment of Benign Ulcers of the Esophagus, with a Case Report. *J Thorac Surg*, 1936, 6, 20.

Benign ulcers of the esophagus are difficult to diagnose and to treat. Frequently they lead to disability and invalidism, and sometimes to death by hemorrhage and perforation. The symptoms in general resemble those of gastric and duodenal ulcer. Decker believes that the lesions occur much more frequently than they are diagnosed. In cases in which the presence of such an ulcer is suspected he urges direct examination by esophagoscopy. He calls attention to the value of biopsy and to the danger of perforation with the esophagoscope and the biopsy forceps with subsequent mediastinitis. He states that the esophagoscopy examination should be made only by an experienced esophagoscopist. When perforation occurs, mediastinal drainage should be done early, before symptoms develop.

The patient whose case is reported had a duodenal as well as an esophageal ulcer and apparently

dangerous paradoxical movements of the thoracic wall when maximal collapse is necessary, (4) provision for progressive pulmonary collapse by formalization of the periosteum of the ribs to prevent regeneration of ribs posterolaterally, (5) resection of the entire lengths of the vertebral processes and the underlying necks of the ribs at above and below the level of the pulmonary cavity to increase pulmonary collapse in the costovertebral gutter and (6) removal of the upper ribs first with preservation of the lower ribs for respiratory function when there are no lesions in the lower lung requiring collapse.

The author cites statistics to show the striking improvement that has occurred in the results of thoracoplasty in the last ten years.

LARL O. LATIMER, M.D.

**Carter B. N. The Late Results of Thoracoplasty in the Treatment of Pulmonary Tuberculosis**  
*Ann Surg* 1935 101 332

Carter reports on a series of 103 cases of pulmonary tuberculosis which were treated by thoracoplasty. In by far the greater number complete thoracoplasty was done according to the earlier technique that is the removal of relatively short segments of 7 or more ribs. At least two and one half years have elapsed since the operation in every case and as many as eleven years in some of them.

Fifty-eight of the 103 patients are working and have a negative sputum. 4 have a negative sputum, but are unable to work. 5 are able to do some work, but still have a positive sputum. 9 with a positive sputum are completely unable to work and 27 are dead.

Of the 27 deaths 9 occurred within from two to thirty five days and can be attributed to the operation. The late deaths were nearly all due to some form of tuberculosis. J. DANIEL WILLIAMS, M.D.

**Boland F. K. Traumatic Surgery of the Lungs and Pleura**  
*Ann Surg* 1935 104 572

Of 1187 wounds of the chest treated at the Grady Hospital Atlanta in the period from 1922 to 1935 1,000 (85 per cent) were penetrating wounds. In addition there were 16 stab wounds of the heart and 1 stab wound of the pericardium which were treated with recovery in 50 per cent.

The ratio of males to females was 3:1 and the average age of the patients twenty seven years.

Seven hundred and ninety nine (79 per cent) of the wounds were stab wound, 707 (21 per cent) were gunshot wounds. 2 were due to automobile accidents and 1 was due to a fall from a roof.

Pain, weakness and shock were constant symptoms. Cough and hemoptysis were signs of uncertain value, and their absence was not regarded as significant. Hemoptysis is rarely fatal unless one of the large vessels is ruptured or there is a direct communication between a bronchus and a vessel or extensive laceration of a lung which is unable to collapse because of adhesions. Dyspnea was usually present, and marked distress in breathing usually

meant pneumothorax or hemothorax. Two characteristic early signs were lagging of the affected side on respiration and moist rales over the area involved. As a rule the pulse and respiratory rates were increased and fever and leucocytosis were present in the cases of hemothorax. There was decreased resonance and diminution of the respiratory sounds until the presence of air caused increased resonance and the presence of fluid caused dullness. Cyanosis was difficult to recognize in these patients.

Hemothorax was diagnosed in 248 (25 per cent) of the cases, pneumothorax in 103 (19 per cent), and hemopneumothorax in 382 (38 per cent). The maximum amount of bloody fluid aspirated at one sitting was 2,700 c.c.m. The greatest total amount in a case was 10,900 c.c.m. over a period of five weeks. Dyspnea was always present and often was intense. The temperature rose to as high as 103 degrees F and subsided after withdrawal of the fluid.

The roentgen evidence consisted of elevation of the diaphragm on the affected side.

Infection was extremely rare. Empyema occurred in 17 cases, pneumonia in 8, and abscess and gangrene in none.

Cellular emphysema was present in 159 (15 per cent) of the cases but did not necessarily indicate penetration.

In the great majority of the cases the treatment was simple. It consisted of sterilization of the wound, debridement if indicated, strapping of the chest, immediate suture of sucking wounds, bed rest and the administration of ample sedatives. Shock was treated in the usual way. Tetanus and gas bacillus antitoxin were given in the majority of the cases and tetanus and gas bacillus infections did not develop. The most serious consequence of thoracic trauma is hemorrhage. As air and fluid in the thoracic cavity act as a tampon to prevent further bleeding, aspiration was never done during the first forty eight hours unless distressing dyspnea was present. Blood was aspirated in 185 (18 per cent) of the cases and air in 9. Of 18 cases in which the diaphragm was sutured recovery resulted in 10.

The total number of deaths was 136 a mortality of 13 per cent. Forty six of the deaths occurred within twenty four hours after the patient's admission to the hospital. Therefore 90 (9 per cent) were attributable to remediable trauma of the chest.

J. DANIEL WILLIAMS, M.D.

**Penberthy, G. C. and Benson, C. D. A Ten Year Study of Empyema in Children**  
*Ann Surg* 1935 104 579

Of 5,803 cases of pneumonia treated during the years from 1926 to 1946 empyema developed as a complication in 407. The mortality in the latter was 10.3 per cent. There was a definite parallelism between the mortality of pneumonia and that of empyema. Of the 407 patients developing empyema 365 survived and all but 3 made an excellent clinical recovery.

A uniform procedure of surgical drainage combining the closed and open methods was used. This consisted of trocar cannula catheter insertion under local anesthesia, clamping of the catheter with a hemostat, and aspiration. After from twelve to eighteen days, the catheter was allowed open. Rib resection was necessary in only 15 cases. The Wangenstein method of suction was found a valuable aid in shortening the period of morbidity due to failure of the lung to re expand after the surgical drainage.

J. DANIEL WILLEM, M.D.

### ESOPHAGUS AND MEDIASTINUM

Even, N. L. The Surgical Management of Congenital Atresia of the Esophagus with Tracheo-Esophageal Fistula. *J. Thoracic Surg.* 1936 6 30

In the most common type of atresia of the esophagus there is an upper segment which terminates blindly just above the bifurcation of the trachea. The lower segment has a fistulous communication with the trachea, usually from 0.5 to 1.0 cm. above the bifurcation of the latter or less frequently, with a bronchus. The upper segment is usually hypertrophied and dilated. Its average length is 3 or 4 cm. As a rule the lower segment of the esophagus at the cardiac end is of normal size, but often it diminishes in caliber toward the communication with the trachea.

The symptoms associated with this lesion are quite characteristic. At birth the child appears to be well nourished and well developed but has difficulty from large amounts of frothy mucus which fill the mouth and pharynx and drools from the side of the mouth. It takes the breast eagerly, but after a few swallows stops breathing, becomes cyanotic and regurgitates frothy mucus and feedings through the nose and mouth. It appears as if it would drown but after a period of lifeless relaxation usually recovers and repeats this performance with each subsequent feeding. The average weight loss before death is from 25 to 40 per cent. The upper abdomen is frequently distended because of air in the stomach.

The common type of atresia of the esophagus presents 3 problems: (1) feeding, (2) management of the fistulous communication of the lower segment of the esophagus with the trachea, and (3) care of the blind pouch of the upper esophageal segment.

The most frequent procedure for purposes of feeding is gastrostomy. This in itself may hasten death since food can travel in a retrograde manner through the distal segment of the esophagus and enter the trachea through the fistulous opening. Such regurgitation may occur also after jejunostomy. Legitimate objections are made against ligating the cardia to prevent it.

While it is generally believed that the blind pouch of the upper segment of esophagus is treated best by cervical esophagostomy, the author prefers intermittent aspiration of the mucus and saliva from the mouth. By this means he delays the stage of the operative procedure.

Leven enters the abdomen through an upper left rectus incision extending to the costal margin. The relatively enlarged liver of the newborn makes the exposure difficult. The stomach is gradually retracted until the cardia is reached. The subdiaphragmatic esophagus and the cardiac end of the stomach are mobilized by blunt dissection. With care in dissection a centimeter of the mediastinal esophagus can be pulled into the abdominal cavity. To aid in the traction a rubber tissue drain is passed under the mobilized esophagus. By depressing the abdominal wall and exerting moderate traction on the rubber tissue drain the cardiac end of the esophagus and the stomach can be brought into the operative wound. The peritoneum and sheath of the rectus muscle are sutured under the exteriorized cardia and esophagus with 2 mattress sutures of chromic catgut. A multiple pursestring type of gastrostomy is then made in the stomach distal to the exteriorized portion. The abdominal wound is closed and a soft rubber catheter placed under the exteriorized portion of the stomach. The ends of the catheter are fastened to the abdominal wall with adhesive tape. By this method an angulation is formed at the cardia, proximal to the gastrostomy. This angulation effectually prevents regurgitation of gastric contents into the lungs.

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LARL O. LATIMER, M.D.

Decker H. R. The Diagnosis and Treatment of Benign Ulcers of the Esophagus, with a Case Report. *J. Thoracic Surg.* 1936 6 20

Benign ulcers of the esophagus are difficult to diagnose and to treat. Frequently they lead to disability and invalidism, and sometimes to death by hemorrhage and perforation. The symptoms in general resemble those of gastric and duodenal ulcer. Decker believes that the lesions occur much more frequently than they are diagnosed. For cases in which the presence of such an ulcer is suspected he urges direct examination by esophagoscopy. He calls attention to the value of biopsy and to the danger of perforation with the esophagoscope and the biopsy forceps with subsequent mediastinitis. He states that the esophagoscopy examination should be made only by an experienced esophagoscopist. When perforation occurs, mediastinal drainage should be done early, before symptoms develop.

The patient whose case is reported had a duodenal as well as an esophageal ulcer and apparently

had suffered from this condition for from eighteen to twenty years. He has been under treatment and is now apparently well.

MILLARD F. ARBUCKLE, M.D.

Rose J. D. Myoma of the Esophagus. *Brit J Surg* 1930 24 297

Myoma of the esophagus is very rare. There are records of only 40 cases. In the case reported by the author, death resulted from esophageal stenosis. There are no characteristic symptoms and the diagnosis is always made after death. The tumor is buried in the wall of the esophagus. Rose describes its appearance at postmortem examination. It is assumed that the neoplasm is congenital and that after it increases in size there is a certain degree of esophageal dilatation due to forceful attempts at swallowing.

MILLARD F. ARBUCKLE, M.D.

Lab. A. The Functional Results of Prethoracic Esophagoplasty (Das funktionelle Ergebnis der subthorakalen Speiseröhrenplastik). *6. Tag d. deutsch. Ges. f. Chir.* Berlin 1930.

On April 20, 1931, Lexer presented before this Society the patient upon whom the first completely successful prethoracic esophageal plastic operation was performed in Germany. This circumstance justifies a short review of the results of this type of operation to date and an attempt to present a detailed picture of the function of the artificial esophagus. As is well known, the procedure as developed by Lexer into a standard operation consists in the union of the methods of Roux. An esophageal tube is formed from a transposed loop of jejunum and a skin tube is formed according to Bitcher's method, which was first attempted also by Lexer independently of Bitcher. On the basis of his experience Lexer developed own method to avoid the disadvantages and dangers of the aforementioned operations, especially necrosis of the long loop of small intestine which is poorly nourished in its upper portions and digestion of the skin canal by the gastric juice.

His operation is performed in 3 stages. In the first stage a loop of jejunum is transposed under the skin up to the costal arch or a little higher and is implanted into the stomach. The short loop is well nourished by its mesentery. In the second stage a skin tube is formed from a quadrangular flap. At first this tube is formed by the formation of a tent-shaped flap. At first the canal was covered with skin mobilized by relaxing incisions so that it could be united over the skin tube without tension. Later to simplify the method Lexer covered it with transplants of epidermis from the thigh. The skin tube is immediately joined to the loop of intestine. In the third stage the esophagus is dissected out and divided transversely and the skin tube is united with it on the left side near the sternoclavicular junction. The aboral end of the esophagus is sewed into the skin and the blind pouch is destroyed by cauterization and roentgen irradiation.

The author reports the functional results in 2 cases in which esophagoplasty was performed by the described method.

The first case was that of a man twenty-four years old whose esophagus had been burned with lye nine years previously. Following the burn, stricture occurred and nutrition was maintained through a gastrostomy. In 1922 an artificial esophagus was formed by Lexer and in 1926 a stricture at the junction of the skin canal and intestinal loop was relieved.

The second case was that of a man thirty-one years old who at the age of three years burned his esophagus by swallowing a wood stain. He had been nourished for twenty years through a gastrostomy. In 1918 and 1920 Lexer made an artificial esophagus. The skin canal was covered with epidermis obtained from the thighs.

Clinical observation of both of these men showed that they had completely normal swallowing ability. When the food was very dry, the drinking of water during the meal was found to be desirable. The fact that peristalsis still persisted in the part of the esophagus formed by the loop of small intestine after a period of fourteen and seven years respectively shows the importance of isoperistaltic implantation of the loop.

Observation under the fluoroscope showed that at the point of transition from the cervical part of the esophagus to the skin tube there was a widening of the lower part of the esophagus. Comparison with previous roentgenograms disclosed no increase in the dilatation. The entrance of the skin tube into the intestinal loop had transformed itself into a cardiac-like structure. The mucosal folds of the loop of small intestine had invaded the interior of the skin tube and aided in the propulsion of the food. This condition, which is normal at the cardia and pylorus, is recognized as a sign of functional adaptation in artificial anastomoses.

Examination by means of surface kymography by the Pleikart Stumpf method made it possible to determine more definitely the movements during the act of swallowing and during propulsion of the contrast mass through the artificial esophagus. This method is a combination of kymographic recording with simultaneous roentgen examination. It was found that the act of swallowing and the peristalsis in the cervical portion of the esophagus moved fluid and semifluid contrast media into the skin canal rapidly but not by squirting. Aside from the motion of the chest wall and heart, the kymograms showed in the skin tube unmistakable wave-like movements which resembled true peristaltic movements. These movements could be discerned from the changes in shape of the contrast mass. As the skin canal does not contain any muscle, the movement is obviously not a peristalsis but due to pressure changes caused by the act of swallowing (alternate lowering and rising of the pressure) within the skin tube. These pressure changes have already been measured manometrically by Schreiber.

The kymographic record of the movements showed true peristalsis in the portion of the esophagus formed by the loop of small intestine, which led to characteristic mixing movements in the jejunal portion. The latter takes over the role of an ante stomach. It was found kymographically that an overflow or backflow from the jejunum into the skin canal did not occur during the period of observation, a fact showing that this portion of the esophagus functions like the cardia. Under all circumstances the kymographic examination showed a marked similarity between the function of the artificial esophagus and that of the normal esophagus. The kymographic observations of Dahn made on normal esophagi demonstrated that normal peristaltic movements occur in the thoracic portion only when an unusual demand is made upon the esophagus (patient in the Trendelenburg position or standing on his head).

The observations made on the artificial esophagus constructed according to the method of Lexer show that the esophagus functions with a most thorough adaptation to the well known conditions existing in the normal esophagus. This is the aim of restorative surgery. A large compilation made from the world literature by the Americans Ochsner and Owens, in 1934 presents 240 cases in which an artificial esophagus was made. All of the methods of operation proposed up to that time were represented. Most of the operations were performed in Europe (Germany, Russia, Austria, Roumania). As in 100 of the 240 cases the esophagus was formed by the method devised by Lexer and with which Lexer often obtained successful results the conclusion is justified that, in general, Lexer's method is the most certain, simple, and promising.

In the discussion of this report, HABERLAND showed cinematographic pictures of a man twenty one years old who had suffered from complete occlusion of the esophagus since the age of six and had been operated upon by Frangenheim and Haberland fifteen years previously. At that time an esophageal plasty was performed according to the method of Roux and Wullstein.

HABERLAND demonstrated the swallowing mechanism, the peristaltic as well as the antiperistaltic movements of the transplanted pedicled loop of small intestine, and called attention to many other interesting physiologic processes in the transplant.

STRODA reported a total esophagoplasty which was performed twenty four years ago. The patient was a seventeen year old girl with an impermeable corrosive stricture of the esophagus. Two years after gastrostomy a skin tube was constructed on the anterior surface of the chest and united with the cervical portion of the esophagus. This tube ended below the xiphoid process of the sternum. For several months a large rubber tube was used as a substitute connection between the skin tube which terminated in the neighborhood of the gastrostomy and the esophagostomy opening. The patient was able to swallow and digest all kinds of food to carry on her

work, and to eat at the table with strangers without having her condition discovered. The skin canal fitted so tightly about the rubber tube that no food seeped through around the latter. The patient gained weight up to 93 lb. Before the operation she had weighed 56 lb.

In 1914 a loop of the upper portion of the jejunum was isolated, its aboral end implanted in the stomach, and its oral end fixed to the lower end of the skin tube in the epigastrium. By means of several operations connection between the skin tube and the transposed small intestine was obtained.

In 1919 the patient moved to the Ukraine as the wife of a former Russian war prisoner. According to a recent report she is getting along very well. She has had 3 pregnancies. The first 2 children died because of the famine in that region, but the third child is alive. Because of poor and insufficient nourishment the patient had suffered with gastric symptoms for years, but these now seem to have disappeared. So far as can be judged from a photograph, she looks very well.

In this case it was possible to replace most of the esophagus by an antethoracic plastic skin operation and the use of a comparatively small portion of small intestine as a connecting piece with the stomach.

(A. LON) HARRY A. SALZMAN, M.D.

Walker, R. M. Mediastinal Lipomas. *J. Thoracic Surg.* 1936, 6, 89.

Walker reports a case of large lipoma of the mediastinum. A portion of the tumor weighing 515 gm. was removed successfully, but for several hours after its resection there was considerable oozing from the lining of the cavity. Six months later the tumor was larger than it was prior to the operation and began to cause considerable distress. At a second operation practically all of it was removed and a large gauze roll was inserted to prevent oozing such as had occurred after the first operation. Twenty one hours later the patient's heart stopped suddenly and he could not be revived. On removal of the gauze plug from the wound the cavity was found quite dry.

ELIZABETH M. CRANSTON

Fox, J. P. and Hoppers, G. A. Solid Teratoid Tumors of the Anterior Mediastinum. *Am. J. Cancer* 1936, 28, 273.

The term 'teratoma' is used to designate tumors derived from all 3 germ layers and the term 'teratoid' a large group of essentially similar tumors derived from only 2 or 1 germ layer. Most commonly, teratoid tumors are related to the gonads but not infrequently they are retroperitoneal, intracranial or mediastinal. Mediastinal teratoids almost invariably arise in the anterior mediastinum. The authors estimate that about 200 such tumors have been reported. Of these 55 per cent were apparently simple dermoids, 25 per cent complex benign dermoids, and 20 per cent malignant tumors.

They report in detail 2 cases of mediastinal tumor. The first was that of a man twenty one years old



who was first seen at the age of fourteen years because of Horner's syndrome. This syndrome underwent spontaneous regression. Later the patient developed symptoms due to a roentgenologically demonstrable mediastinal mass which grew rapidly in spite of x-ray therapy. Postmortem examination revealed a large hemorrhagic and necrotic tumor in the anterior mediastinum. On histological examination the neoplasm was found to contain mixed epithelial elements which were predominantly endodermal and in places to be undergoing carcinomatous degeneration. The most predominant element was an immature type of cell resembling the megakaryocyte of bone marrow. There was widespread metastasis of this chief malignant element to the lymph nodes, lungs, spleen, liver, and bone marrow. Because of its morphological character, the association of myeloid and erythroid forms with the tumor and its growth in bone marrow, this sarcomatous portion was regarded as arising from marrow cells.

The second case was that of a man forty-eight years old who had had symptoms referable to a chest tumor for three years. At autopsy a massive tumor weighing 0.6 kgm. and apparently arising in the anterior mediastinum was found occupying most of the thorax. The neoplasm had caused almost complete pulmonary collapse. Microscopic examination showed the bulk of it to be made up of adult adipose tissue intermingled with immature fat varying from the fetal type to liposarcoma. Incorporated in the upper anterior portion of the tumor was recognizable thymus tissue. Several cervical lymph nodes contained liposarcomatous metastases. The inclusion of thymus in the neoplasm suggested that the tumor was of a teratoid nature. J. S. L. (Lancet) MD

## MISCELLANEOUS

Graef I and Steinberg I. Superior Pulmonary Sulcus Tumor. A Case Exhibiting a Malignant Epithelial Neoplasm of Unknown Origin with Pancoast's Syndrome. *Am J Roentgenol*, 1936; 36: 93.

The authors report the case of a man 47 years of age who had a slowly expanding tumor of the right supraclavicular fossa. Pancoast's syndrome occurred early in the course of the disease and there was severe pain referred to the right brachial plexus. The muscles of the right upper extremity were atrophied. Roentgen examination disclosed evidence of destruction of the adjacent first and second ribs, portions of the sixth and seventh cervical vertebra, and the lateral processes of the first and second thoracic vertebrae.

Autopsy revealed a pleomorphic epithelial tumor which was limited for the most part to the deep tissues of the neck but involved the carotid sheath, the brachial plexus, the bones mentioned, and the lungs. The pulmonary involvement consisted of a thin plaque-like extension of tumor cells to the visceral pleura at the right apex. Two minute metastatic nodules were found in the right kidney.

The authors believe that the tumor was of extra-pulmonary origin. Investigation of the possibility that it may have arisen from a branchial vestige was prevented by the limitations of the autopsy.

In conclusion the authors emphasize the need for thorough local, systemic and roentgen examinations of the base of the neck in the cases of patients with persistent pain and other symptoms referable to involvement of the brachial plexus or the inferior cervical ganglion. J. S. L. (Lancet) MD

# SURGERY OF THE ABDOMEN

## GASTRO-INTESTINAL TRACT

Reschke, H. The Treatment of Severe Hemorrhage Due to Gastric Ulcer (*Die Behandlung der schweren Magen-schwerwüersblutung*) 60 *Tage d. deutsch. Ges. f. Chir.*, Berlin, 1936

The answer to the question whether, in general, operation should be performed in cases of severe hemorrhage due to gastric ulcer depends upon judgment of the effectiveness of medical therapy. Evaluation of medical therapy has been very difficult, but in recent years there has been an increase in medical statistics which may be of aid in solving the problem.

**Moderately severe hemorrhage.** In 1935, Petso-poulos reported from the *Umbel Clinic* on a series of 433 cases of moderately severe hemorrhage with 41 deaths, a mortality of 9.5 per cent, and in 1932 Moosberg reported a mortality of 9 per cent. A collection of Berlin hospital statistics for 1934 and 1935 shows a total of 1,023 cases with 98 deaths, a mortality of 9.5 per cent. Bulmer reported that over a period of thirty years the mortality in his cases was 10 per cent and that the mortality of males was twice as high as the mortality of females.

It is interesting to note that the mortality rates recorded in these reports are approximately the same. The report of Bulmer that the mortality of his male patients was twice as high as that of his female patients agrees with other reports in the literature which record a higher mortality among males than among females.

**Severe hemorrhage.** In 1934, Heller reported a mortality of 17.8 per cent in cases of severe hemorrhage, and in 1932 Chiesman a mortality of 27 per cent in the cases of 137 males and 15 per cent in the cases of 54 females. In cases of hemorrhage which is uninfluenced by medical therapy or recurs after twenty-four hours the mortality is 74 per cent. In 280 cases of severe hemorrhage reviewed by Petso-poulos the mortality was 14.6 per cent. Collective Berlin statistics on 427 cases showed a mortality of 22.5 per cent. Moosberg reported a mortality of 31 per cent.

Reports sent to the author by Reindorf to the Berlin Reimckendorf Pathologic Institute and by the pathologist Hjort are summarized as follows.

At the Institute, bleeding ulcer was found in 23 of 4,720 autopsies. In the last three years it was found in 11 of 1,713 autopsies, and in 1935, in 3 of 113 autopsies. Hjort reported that in 1934 it was discovered in 22 of 4,460 autopsies. He stated that in 17 of the cases the bleeding vessel could have been found at operation, in 2 its discovery at operation would have been doubtful, and in 3 it could not have been found at operation. The figures indicate that a bleeding gastric ulcer is found in 1 of every 200 autopsies. Therefore the belief of some that gastric hemorrhage is not dangerous is unjustified.

Practically every experienced internist and surgeon has seen patients die of gastric hemorrhage and has wondered afterward whether surgical intervention might not have saved their lives. Von Mikulicz was therefore led to try such treatment. Although he gave it up after several attempts, he said that, in spite of the difficulties, the surgeon could not neglect these cases altogether. Experience has taught so much with regard to many other conditions with even greater difficulties that there is the prospect that it will do likewise in this condition.

The difficulties are tremendous because the diagnosis is not always clear and certain and because the patients are in such poor condition as the result of the repeated severe bleeding that a very small added insult may be fatal. The courage and skill of the earlier surgeons who attempted operation before blood transfusion was used and achieved successful results were remarkable. It was under such conditions that Finsterer recommended operation to eliminate the uncertainty, which at that time was the only course open. His results with a mortality of 5 per cent are noteworthy, but only a few cases responded satisfactorily. Today the results of surgery have been improved by the possibility of giving a large blood transfusion before operation. Other surgeons besides Finsterer have also become active in the treatment of gastric hemorrhage. Von Haberer believes that surgical intervention is indicated in cases of severe bleeding in which a diagnosis of gastric ulcer has been made, but that in cases in which the diagnosis is not positive conservative treatment should be tried first. On the basis of such indications Friedemann operated in 18 cases of severely bleeding gastric ulcer with 1 fatality. Ritter and a number of surgeons in other countries have also expressed the opinion that operation may be of value.

Reschke reports on 12 operations for bleeding gastric ulcer which he performed with 2 deaths. One of the deaths was that of an old man who died of pneumonia fourteen days after the operation from which he had shown good recovery. In the other fatal case death occurred three days after the operation as the result of peritonitis caused either by the operation or suture insufficiency. There had been a severe hemorrhage, but the operation was not urgent. As the patient was corpulent, the author had decided to postpone operation when it was requested. The other patients were markedly exsanguinated, their hemoglobin ranging from 40 to 20 per cent. Some of them were nearly pulseless, and 2 had severe dyspnea. One of the latter was unable to speak. One patient was completely unconscious and had had a number of severe attacks of convulsions which could be attributed only to anemia of the brain. On the basis of his experience, the author would not have attempted operation on any of these patients without a previous blood transfusion. While he is

not certain that all of them would have died without operation since there are repeated reports of recovery without surgical treatment of patients whose condition was regarded as hopeless. He is convinced that they would have died without blood transfusion.

The only method of controlling the hemorrhage surgically is resection. In cases of non-resectable duodenal ulcer, resection for exclusion with ligation of the afferent blood vessels should be done. Gastro-enterostomy may be effective by draining the stomach only in cases of superficial ulcer. In such cases, however, the hemorrhage can usually be stopped by conservative treatment. Reschke has never performed gastro-enterostomy. He believes that the surgeon is able to judge with approximate accuracy whether the hemorrhage is severe, moderately severe or slight. With few exceptions the patients upon whom he has operated have been severely exsanguinated.

Blood transfusion has also rendered conservative treatment more safe. Many believe today with good reason that after blood transfusion operation may be avoided more frequently than formerly because the blood supplied by the transfusion often stops the bleeding. However, transfusion does not always assure definite arrest of the hemorrhage.

It is still impossible to obtain accurate data on the results of transfusion from the literature. At the Berlin Lankow Hospital 3 of 6 patients and at the Elisabeth Diakonissenhaus 2 of 3 patients who were given transfusions died. Stahl reported that 1 of his patients died of sudden hemorrhage the night after a blood transfusion. Friedemann and Oehleker also have reported deaths occurring in spite of transfusion. According to Moosberg, transfusion is effective in stopping hemorrhage in only 50 per cent of the cases in which it is used.

The author states that in his cases blood transfusion has seldom failed to stop the hemorrhage, but often the bleeding has recurred and frequently has then been more severe than before. Recurrent hemorrhage followed transfusion in 5 of the 12 cases he reports. Moreover, he once saw a patient die of ulcer hemorrhage in a few minutes although the transfusion of 800 ccm of blood forty-eight hours previously had had apparently good results. It appears to him that the danger of recurrence of hemorrhage is especially great after the elapse of two days. This demonstrates the uncertainty of expectant treatment by transfusion.

The author states that he agrees with Sauerbruch that it is impossible to base conclusions or statistics on such a small series as 12 cases. In the 12 operations there were 2 deaths, a mortality of 16.5 per cent. This mortality is not so noteworthy when it is compared with that of the early operations performed by Friedemann and Finsterer. However, it is considerably lower than that of Finsterer's late operations (31 per cent), most of which were performed without blood transfusion and considerably lower also than that of internal treatment recorded in the majority of the reports cited. Reschke is im-

pressed most by the recovery of the 10 surviving patients whose condition he regarded as hopeless and upon whom he would not have dared to operate without a previous blood transfusion.

He is of the opinion that in the treatment of severely bleeding gastric ulcer the internist and the surgeon should work together. When the internist concludes that he can do no more, a large transfusion of blood should be given and the surgeon should operate promptly.

(K. RESCHKE) SAMUEL J. FOGELSON M.D.

Patterson, G. A Contribution to the Technique and Results of the Billroth I Resection (*Ein Beitrag zur Technik und zum Resultat der Methode Billroth I*). *Arch. chirurg. Scand.* 1936 78 335.

The author reviews 33 cases of gastric cancer, 44 of ulcer of the duodenum or stomach and 8 of gastritis in which a Billroth I resection was done. The technique used was similar to that described by von Haberer but instead of employing von Haberer's method to make the size of the cut gastric stoma approximate that of the lumen of the duodenum, Jetterson narrowed the gastric stoma by puckering the lesser and greater curvatures with pursestring sutures which approximated the anterior and posterior walls of the stomach and invaginated both curvatures.

In the 18 cases of gastric cancer in which no metastases were evident a radical resection was done with 3 postoperative deaths. In the 15 cases with metastases palliative resections were done with 4 postoperative deaths. Five patients—4 treated by radical resection and 1 by palliative resection—were alive three years after the operation.

Of the 52 patients with gastric or duodenal ulcer or gastritis 40 survived the operation but only 34 of the latter are included in the discussion of the results because 12 were operated upon within a year previous to the time of this report and 3 could not be traced. Only 3 of the 34 patients had postoperative gastric complaints. The symptoms of one of these were attributed to acid gastritis secondary to inadequate resection; those of another to chronic gastroenteritis in a psychoneurotic individual and those of the third to a recurrent marginal ulcer.

Examination of the blood of the entire group of patients showed that 25 per cent were mildly anemic and 13 had well marked secondary anemia. There was no case of anemia of the pernicious type.

Röntgen examination of 45 patients revealed violent or cascade emptying in 5, emptying within from one half to one hour in 13, and emptying in from one to two hours in 27.

SAMUEL J. FOGELSON M.D.

Reichert, F. L. and Mathes, M. E. Experimental Lymphedema of the Intestinal Tract and Its Relation to Regional Cicatrizing Enteritis. *Ann. Surg.* 1936 104 601.

The authors carried out experiments to reproduce the clinical entity now called in the literature "re-

gional ileitis" Irritating and sclerosing solutions, namely, 26 per cent bismuth oxychloride and 5 per cent sodium morrhuate, were injected into the mesenteric and subserosal lymphatic vessels. These injections produced sclerosis and thrombosis of the lymphatics which led to chronic lymphedema. Frequently 1 injection was sufficient. The thickening and edema of the intestinal wall were most marked in the submucosal and muscular layers where the thrombosed lymphatics and lacteals were engorged with large pale mononuclear cells. The thickening was most marked when intravenous injections of bacteria were made in conjunction with the lymphatic injections. The intestinal lymphedema was found to persist for ten months without any evidence of subsidence, and the pathologic changes appeared to be permanent.

The authors believe that there is a close resemblance between the pathologic changes seen in clinical regional enteritis and experimental lymphedema. The more extensive stenosis and mucosal ulceration in regional enteritis may be attributed to the persistence of a chronic low grade bacterial infection. The 2 dominant features of regional cicatrizing enteritis seem to be a low grade chronic infection and an associated lymphedema. JOHN H. GARLOCK, M.D.

Storck, A. H. and Ochlsner, A. Mechanical Decompression of the Intestine in the Treatment of Ileus. I. The Effect of "Stripping" on the Blood Pressure. *Arch Surg*, 1936 33 664

In order to determine the effect of "stripping" the intestine to empty it of its contents in ileus, mechanical obstruction was produced in animals and blood pressure tracings were made during the stripping maneuver.

In all of the animals the stripping caused a fall in the blood pressure. In those with twenty four hour obstruction the greatest fall in the pressure was 40 mm of mercury, the least, 12 mm and the average, 24.6 mm. In those with forty eight hour obstruction the corresponding decreases were 20, 4, and 12.1 mm and in those with seventy two hour obstruction, 32, 4, and 15.4 mm.

Storck, A. H. and Ochlsner, A. Mechanical Decompression of the Intestine in the Treatment of Ileus. II. The Effect of Intestinal Activity. *Arch Surg*, 1936 33 670

To determine the efficacy of 'stripping' the intestine in the treatment of ileus the procedure was used in mechanical intestinal obstruction in animals. After obstruction of the terminal ileum the animals were allowed to go for varying periods of time from forty eight hours to one hundred and forty eight hours before they were re-operated upon. At the subsequent operation on one group of animals an enterostomy was done and the intestine was 'stripped' to empty it of its contents as is occasionally done in clinical cases. In a control group of animals simple relief of the obstruction was done. Twenty four hours after relief of the intestinal ob-

struction observations were made concerning the intestinal activity. In each instance the activity of the intestine was determined by its response to the intravenous injection of 10 c cm of lactate-Ringer solution of 20 times the normal concentration which had been shown in previous investigations to exert a powerful stimulating effect on intestinal activity.

In all, there were 46 animals in which simple relief of the mechanical obstruction was done and 62 animals in which the intestine was "stripped". In the former group there was an increase in activity in 84.7 per cent and no change in 15.2 per cent. In the latter group, those in which "stripping" was used, there was an increase in activity in 83 per cent, no change in 15.2 per cent, and a decrease in 4.8 per cent. In the group in which simple relief of the obstruction was done the average increase in tone was 15.5 mm, the average increase in amplitude, 16.9 mm, and the average duration of the increased activity twenty one and eight tenths minutes. In animals in which intestinal "stripping" was done the corresponding figures were 10.2, 10.6, and 15.8.

From this investigation the authors conclude that 'stripping' is of no value in increasing the activity of the gut and that because of the increased danger of contamination and the definite decrease in the blood pressure which follows the maneuver, it is not justified and should not be done.

Barry, H. C. and Florey, H. W. Histidine Treatment of Peptic Ulcer. *Lancet*, 1936, 231 728

Before undertaking their experimental investigation of the value of histidine in the treatment of peptic ulcer, the authors first reviewed the studies of Aron and Weiss on dogs on which the so called "surgical internal duodenal drainage operation" was performed. Of the 2 control dogs, one died of gastrojejunitis eighteen days after the operation and the other of a large perforated ulcer the fifth week after the operation. Of 4 dogs which were treated postoperatively with histidine and tryptophane, 2 were killed after three weeks and 2 died six and twelve weeks respectively after the operation. None of these animals showed macroscopic or microscopic evidence of jejunal ulceration. Of 2 dogs given daily injections of 1 c cm of a 4 per cent solution of histidine after the operation, 1 was killed after eight weeks and the other died suddenly of a minute acute perforation of the gastrojejunal anastomosis. In the one which was killed at the end of eight weeks no evidence of ulceration or inflammation was found in the intestine. Two dogs treated with tryptophane and 1 treated with lysine developed ulcers in the usual way following melena after the first postoperative week.

From these findings it was concluded that histidine by itself is capable of preventing the formation of ulcer after surgical duodenal drainage. The most obvious criticism of the investigation is based not only on the small number of animals studied, but

not certain that all of them would have died without operation since there are repeated reports of recovery without surgical treatment of patients whose condition was regarded as hopeless. He is convinced that they would have died without blood transfusion.

The only method of controlling the hemorrhage surgically is resection. In cases of non-resectable duodenal ulcer resection for exclusion with ligation of the afferent blood vessels should be done. Gastro-enterostomy may be effective by draining the stomach only in cases of superficial ulcer. In such cases, however, the hemorrhage can usually be stopped by conservative treatment. Reschke has never performed gastro-enterostomy. He believes that the surgeon is able to judge with approximate accuracy whether the hemorrhage is severe, moderately severe or slight. With few exceptions the patients upon whom he has operated have been severely exsanguinated.

Blood transfusion has also rendered conservative treatment more safe. Many believe today with good reason that after blood transfusion operation may be avoided more frequently than formerly because the blood supplied by the transfusion often stops the bleeding. However, transfusion does not always assure definite arrest of the hemorrhage.

It is still impossible to obtain accurate data on the results of transfusion from the literature. At the Berlin Pankow Hospital 3 of 6 patients and at the Elisabeth Diakonissenhaus 1 of 3 patients who were given transfusions died. Stahl reported that 1 of his patients died of sudden hemorrhage the night after a blood transfusion. Friedemann and Oehlecker also have reported deaths occurring in spite of transfusion. According to Moosberg, transfusion is effective in stopping hemorrhage in only 50 per cent of the cases in which it is used.

The author states that in his cases blood transfusion has seldom failed to stop the hemorrhage, but often the bleeding has recurred and frequently has then been more severe than before. Recurrent hemorrhage followed transfusion in 5 of the 12 cases he reports. Moreover, he once saw a patient die of ulcer hemorrhage in a few minutes although the transfusion of 800 ccm. of blood forty-eight hours previously had had apparently good results. It appears to him that the danger of recurrence of hemorrhage is especially great after the elapse of two days. This demonstrates the uncertainty of expectant treatment by transfusion.

The author states that he agrees with Sauerbruch that it is impossible to base conclusions or statistics on such a small series as 12 cases. In the 12 operations there were 2 deaths, a mortality of 16.5 per cent. This mortality is not so noteworthy when it is compared with that of the early operations performed by Friedemann and Finsterer. However, it is considerably lower than that of Finsterer's late operations (31 per cent), most of which were performed without blood transfusion and considerably lower also than that of internal treatment recorded in the majority of the reports cited. Reschke is im-

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(K. RESCHKE) SAMUEL J. FOGELSON, M.D.

Pettersson G. A Contribution to the Technique and Results of the Billroth I Resection (*Ein Beitrag zur Technik und zum Resultat der Methode Billroth I*). *Acta chirurg. Scand.* 1936 78 335.

The author reviews 33 cases of gastric cancer, 44 of ulcer of the duodenum or stomach, and 8 of gastritis in which a Billroth I resection was done. The technique used was similar to that described by von Haberer, but instead of employing von Haberer's method to make the size of the cut gastric stoma approximate that of the lumen of the duodenum, Pettersson narrowed the gastric stoma by puckering the lesser and greater curvatures with pursestring sutures which approximated the anterior and posterior walls of the stomach and invaginated both curvatures.

In the 18 cases of gastric cancer in which no metastases were evident a radical resection was done with 3 postoperative deaths. In the 15 cases with metastases palliative resections were done with 4 postoperative deaths. Five patients—4 treated by radical resection and 1 by palliative resection—were alive three years after the operation.

Of the 32 patients with gastric or duodenal ulcer or gastritis, 49 survived the operation, but only 34 of the latter are included in the discussion of the results because 12 were operated upon within a year previous to the time of this report and 3 could not be traced. Only 3 of the 32 patients had postoperative gastric complaints. The symptoms of one of these were attributed to acid gastritis secondary to inadequate resection, those of another, to chronic gastroenteritis in a psychoneurotic individual and those of the third, to a recurrent marginal ulcer.

Examination of the blood of the entire group of patients showed that 25 per cent were mildly anemic and 13 had well marked secondary anemia. There was no case of anemia of the pernicious type.

Röntgen examination of 45 patients revealed violent or cascade emptying in 5, emptying within from one half to one hour in 13, and emptying in from one to 10 hours in 27.

SAMUEL J. FOGELSON, M.D.

Reichert F. L. and Stathes M. E. Experimental Lymphedema of the Intestinal Tract and Its Relation to Regional Circulating Enteritis. *Ann. Surg.* 1936 104 601.

The authors carried out experiments to reproduce the clinical entity now called in the literature "re-

studied *in situ* and examined grossly and microscopically after removal. The sections for microscopic study were made at the tip, the center, and the base.

Of the gross diagnoses as to the presence or absence of lumen obliteration, only 39 per cent were incorrect. In the great majority of instances the error was due to failure to recognize very early degrees of obliteration. The incidence of obliteration was greater in retrocecal appendices than in appendices lying in an anterior position, and greater in shorter appendices than in appendices longer than 6 cm.

It was only in the cases of subjects above the age of forty years that total lumen obliteration was found to any appreciable degree. Only 22 per cent of all lumen stenoses occurred before the age of forty, while 80 per cent occurred between the ages of thirty and seventy. However the fact that 50 per cent of the specimens in each age group before the seventh decade were still patent seems to the author to demonstrate that involutionary processes cannot entirely explain the mechanism of lumen obliteration.

Five carcinoid tumors were found. Accordingly, there was 1 carcinoid tumor to every 82 cases of obliteration. All of these neoplasms were found in obliterated portions of the lumen.

Two types of inflammatory obliterative processes were differentiated. The author describes the histologic characteristics of each in detail. He states that the type of reticulum and collagen encountered in an obliterated appendiceal lumen is comparable to that observed in granulation tissue and in scars healing by secondary intention elsewhere in the body. He was able to find no proof that the sympathetic nerve plexuses of the appendiceal wall or neuromas formed from argentaffine cells play any appreciable role in the formation of new connective tissue present in the obliterated lumen. He believes that the carcinoid tumors are derived as a rule from submucosal epitheliocarcinogenic elements.

He cites the following factors as playing important rôles in the mechanism of obliteration of the appendiceal lumen:

- 1 The vestigial nature of the appendix
- 2 The terminal type of its blood supply
- 3 The involutionary process that begins in the appendix as in all other body tissues at about the age of twenty-five years
- 4 Progressive obliteration of the capillary bed of the appendix after maturity is reached similar to that occurring in the capillary beds of all parenchymatous organs
- 5 The well known inability of the appendix to cope with even mild infection
- 6 The tendency of adipose tissue to collect in the appendiceal submucosa
- 7 Histological changes due to inflammation
- 8 The tendency of all organs containing an excess of lymphoid tissue to undergo involution after maturity

The author believes that the greater frequency of obliteration of the appendix in older individuals is more apparent than real as in older persons the condition is often due to an inflammation early in life.

He concludes that obliteration of the appendiceal lumen occurs largely as the result of inflammation which destroys the mucosa and portions of the submucosa, involution being merely a contributing factor.

JORN W. CHRISTIAN, M.D.

Suermondt, W. F. The Treatment of Appendicitic Infiltrations and Abscesses. (Die Behandlung der appendicitischen Infiltrate und Abscesse.) *Deutsche Zeitschr. f. Chir.*, 1930, 247, 96.

At the Leiden Clinic it has been held during the last twenty-five years that in acute appendicitis without extension to adjacent structures and in appendicitic diffuse peritonitis the appendix should be removed at once, whereas in cases of appendicitic infiltrations and abscesses the treatment should be conservative because the body has already walled off the infectious process from the rest of the peritoneal cavity and if appendectomy is done at once the adhesions will be separated by the operation and the previously encapsulated peritonitis may become generalized. Another danger of immediate appendectomy in cases of the latter type is the formation of spontaneous postoperative fistulas. Therefore all depends upon whether the disease has reached the stage of infiltration when the patient enters the hospital. The forty-eight hour limit is no longer considered an important factor in the indications for operation. If a patient with all the signs of an acute, progressing appendiceal inflammation is admitted to the hospital after forty-eight hours immediate operation is performed. If on the other hand a patient is admitted with a palpable infiltration in the appendiceal region within forty-eight hours operation is delayed. The transition between infiltration and abscess is gradual. Therefore no sharp differentiation is made between infiltration and abscess with regard to the indications for operation.

The patient with an appendicitic infiltration is placed at absolute rest in bed in Fowler's position and treated by the application of an icebag and diet. The extent of the infiltration is ascertained at the time of his admission. If the infiltration subsides by resorption, operation is performed six weeks later. If an abscess forms, operation is done only if the abscess points upward or medially, that is, toward the free peritoneal cavity. Extension downward is not an indication for operation. The 3 forms of spontaneous rupture—into the rectum, the vagina and the bladder—are not serious complications. At the subsequently necessary operation an incision giving good exposure, such as the pararectal or the long gridiron incision is essential. If operation is done because of extension of the abscess the abdomen is merely opened and drained; the appendix is never sought. In 6 cases a spontaneous intestinal fistula developed following the incision of an appendiceal abscess but in all it closed spontaneously.

The results during the past twenty five years are summarized as follows

1 In 2853 cases of acute appendicitis without or with free non-encapsulated peritonitis which were treated by immediate operation there were 77 deaths a mortality of 2.7 per cent

2 In 407 cases of acute appendicitis with encapsulated peritonitis which were treated conservatively there were 3 deaths a mortality of 0.7 per cent In 256 cases in which only expectant treatment was given there were no deaths and in 151 in which the abscess was opened 2 deaths In 403 cases in which a secondary appendectomy was done there was 1 death a mortality of 0.3 per cent

3 In 778 cases of chronic appendicitis in which operation was performed there were 2 deaths (2 from chloroform in the years 1911 and 1913)

Of the 3 deaths in Group 2, 1 was probably due to a technical error The others were those of patients who were in such poor condition at the time of their admission to the hospital that they probably could not have been saved by any treatment Of the patients in Group 1 who were treated during the first ten years of the reviewed period 50 (7.9 per cent) died whereas of 223 of this group who were treated during the last fifteen years only 27 (12 per cent) succumbed

In the author's opinion conservative expectant treatment of appendicitis abscesses and infiltrations yields better results than immediate appendectomy The mortality of radical treatment is given by Abel as 4.0 per cent by Rieder as 7 per cent and by Stich as 5.1 per cent

(HACKMAN) LEO M. ZIMMERMAN M.D.

Sunder Plassmann P. The Etiology of Recurrent Appendicitis (Zur Aetologie des Appendicitis recidivus. *Beitr. klin. Chir.* 1936 163 495)

The question regarding the cause of true recurrence of appendicitis in man is partly a question of the pathogenesis of appendicitis in general In many of the theories the sympathetic nervous system has a place Undisturbed function and elimination without stasis are of importance According to Roessle the absence of evidence of inflammation in even markedly linked and adherent appendices proves that the position and shape of the organ are of less importance than its automatic purification by undisturbed functioning of its neuromuscular apparatus This is true not only as regards the acute primary attack of appendicitis but also as regards recurrence of the condition since after the first attack there may be a resulting permanent motor injury

Reisser described pathologic changes in the ganglion cells of the appendix occurring in chronic appendicitis The author was able fully to confirm the normal and the pathologicohistologic findings of Reisser and to make noteworthy additional observations He states that in the walls of the human appendix there is an exceedingly sensitive and highly differentiated nervous apparatus every single smooth

muscle cell is closely encompassed by a sympathetic terminal reticulum He shows this by excellent illustrations In all of appendices removed because of chronic or acute appendicitis distinct pathologic changes were found This was true also of appendices in which in spite of definite clinical symptoms no macroscopic or microscopic changes were revealed by the usual methods of examination In the latter the neurofibril apparatus of the intramural plexus was often well preserved whereas the ganglion cells presented pathologic changes in the form of chromatolysis and hyperchromatolysis The terminal reticulum was also well preserved as a rule In subacute appendicitis however there seemed to be signs of beginning injury of the terminal reticulum as it had a more granular aspect Also at this stage the aforementioned changes in the ganglion cells appear and in addition there is a matting together of ganglion cells with deformity of the nuclei In chronic appendicitis the changes are more distinct The autolytic process in the nuclei extends into the bodies of the ganglion cells The chromatolytic nuclei are pushed to the edges of the cells the cells present peculiar radiating pointed and short jagged processes, and the external edges of the cells look as though they had been nibbled In some places there is vacuole formation while in others there is hyperchromatolysis In acute appendicitis the same pathological reactions occur even after the first attack but their effect is first noted later in the Bielschowsky histologic picture The destructive process seems to be irreversible The infiltration of the smooth musculature by the leucocytes in acute appendicitis must necessarily have an unfavorable effect also on the function of the ganglion-cell apparatus and the terminal reticulum This is indicated by the matting together of the fibril structure the chromatolysis and the fusion of several ganglion cells

The findings of the author's investigations show that in appendicitis extensive injury of the intramural ganglion apparatus occurs early This results in a disturbance of the function of the appendix with paresis which in turn is probably one of the causes of recurrence The constancy of the described findings in the ganglion apparatus throws a different light also on those cases in which the clinical symptoms of appendicitis disappear after the removal of an appendix which appears normal at operation

(BLOCHENSTADT) CLARENCE C. REED M.D.

Rankin F. W. Resection of the Rectum and Rectosigmoid by Single or Graded Procedures *Ann. Surg.* 1936 104 625

As a result of his experience in recent years the author has made the following changes in the treatment of cases of carcinoma of the rectum and rectosigmoid

1 Abandonment of intraperitoneal vaccination as a preliminary preparatory step In the cases of 130 patients on whom Rankin performed 200 consecutive operations without the preliminary use of intraperitoneal vaccine the mortality based on the number of

operations was 5.5 per cent and the mortality based on the number of patients 8.4 per cent. This was lower than the mortality in a similar series of cases in which intraperitoneal vaccine was employed.

2. Abandonment of spinal anesthesia. While spinal anesthesia has many advantages, it was abandoned because of inability to control it and because of occasional surgical accidents associated with its use. The author now employs gas oxygen and ether.

3. Extension of the period of preparation to seven days.

4. The routine performance of presacral neurectomy after completion of either the 1 stage or the 2 stage resection. Rankin believes that this procedure is followed by distinct improvement in the emptying of the bladder with consequent lessening of urinary complications. In his opinion the most logical explanation of the beneficial effect of neurectomy is that, in man, the hypogastric nerves carry inhibitory impulses to the bladder which may be sufficient to prevent its complete emptying when these nerves are intact and the pelvic nerves are injured as they are of necessity in removal of the rectum.

5. The routine administration of postoperative transfusions. Rankin has noted that when transfusions are given convalescence is smoother, there is no delayed reaction, and the prognosis is improved.

6. More frequent use of the single stage abdominoperineal resection by the technique of Miles. In 50 cases of carcinoma of the rectum and rectosigmoid Rankin performed 18 abdominoperineal operations in 1 stage by the Miles technique, 16 by the technique of Mummery and 4 combined abdominoperineal operations in 2 stages. In 12 cases the operation consisted of simple exploration. The operability was 76 per cent. There were 5 postoperative deaths.

JOHN H. GARLOCK, M.D.

## LIVER, GALL BLADDER, PANCREAS, AND SPLEEN

Villone S. and Picco A. Tests of Hepatic and Renal Function in the Cases of Patients Operated upon for Conditions of the Biliary Tract (Prove di funzionalità epatica e renale negli operandi per affezioni delle vie biliari). *Arch ital di chir*, 1936 43 303.

In practically all types of operations on the human body, and especially in interventions on the biliary tract, there is some accumulation of toxic substances which must be eliminated through the kidneys. This is evidenced by recent studies of postoperative ketonemia and ketonuria.

The authors present a brief review of the literature on the problem. It has been shown that when operative interference is sufficient to cause demonstrable changes in the biliary tract considerable change occurs also in the parenchyma of the liver. The latter probably leads to hepatic insufficiency of varying degree which may or may not be manifested clinically. Simultaneously with the changes in liver function some disturbance of renal function occurs.

The authors report the findings of a study of the function of the liver and kidneys in 24 cases in which operation was performed for hepatobiliary disease. On the day before the operation a Volhard dilution and concentration test of renal function and a Rosenthal and santonin test of hepatic function were carried out. The results of these tests are compared in a table. It was noted that, in general, there was a definite parallelism between the results of the Rosenthal and Volhard tests but not between those of the santonin and Volhard tests. A. LOUIS ROST, M.D.

Chiray, M. and Albot, G. The Galactose Test in the Diagnosis of Obstructive Jaundice (*L'épreuve des concentrations galactosuriques dans le diagnostic des icterus cholestasiques*). *Presse méd*, Par 1916 44 1577.

The value of the galactose test in differentiating obstructive jaundice from jaundice due to hepatitis has been a subject of controversy. According to Fiessinger and Walter (1931) and Brule and Cottet (1935), obstructive jaundice is always associated with hepatitis and therefore the galactose test will show impairment of liver function as in jaundice due to primary hepatic degeneration.

From a study of 13 cases of obstructive jaundice Chiray and Albot draw very different conclusions. In 10 of the cases the galactose test remained normal over considerable periods of time. The impairment of liver function found in the 3 other cases was explained by the presence of a diffuse parenchymatous hepatitis independent of but favored by the obstruction. The authors point out that biliary hepatitis is always focal, sufficient normal liver tissue remaining to maintain a normal response to the galactose test.

From their findings the authors conclude that the galactose test is usually of definite value in distinguishing obstructive jaundice from the jaundice of hepatitis. ALBERT I. DE CROAT, M.D.

Barbieri, M. The Effects of Cholecystectomy on the Structure of the Bile Ducts (Conseguenze della colecistectomia sulla struttura delle vie biliari). *Riv di chir*, 1936, 2 385.

In a review of the literature the author found a great difference of opinion regarding the changes in the bile ducts following cholecystectomy. After citing some of the findings recorded by others he reports a series of experiments which he carried out on dogs. In one group of 5 dogs he performed a subserous cholecystectomy with amputation of the gall bladder at its junction with the cystic duct and in another series of 5 dogs a subserous cholecystectomy with destruction of the cystic duct. The animals were sacrificed after three, six, eight, ten and twelve months.

In general the changes in the bile ducts of both groups of animals were similar. In the dogs in which the cystic duct was preserved it maintained its normal relationship with the surrounding structures. At the free end of the duct there was some fibrous thickening surrounding the silk ligatures. The length and



lumen of the duct remained unchanged. In a dog examined twelve months after cholecystectomy with destruction of the cystic duct a small dilatation about 2 cm. in volume which represented a new gall bladder was found. The common duct was equally dilated in all of the animals.

The microscopic changes were also similar in all of the animals. In those which were sacrificed after three and six months the cystic and common ducts were lined with only small patches of cells which were flat and atrophied. In the other animals no trace of a lining epithelium remained. In all of the animals there was a definite fibrous tissue thickening of the submucosa with a tendency toward sclerosis and the muscular layers were flattened and atrophied.

A. LOUIS KOST, M.D.

Harkins H. A., Harmon P. H. and Hudson J.  
Lethal Factors in Bile Peritonitis. I. Surgical Shock. *Arch. Surg.* 1936 33 5-6

The 2 factors hitherto cited most frequently in the literature as important in the production of death in bile peritonitis were the toxic action of absorbed bile and the effects of anaerobic bacteria.

The authors present experimental data which indicate that another important lethal factor is the changes commonly found accompanying so-called secondary surgical shock. The mechanism of production of this surgical shock includes the escape of considerable amounts of plasma like fluid into the peritoneal cavity with resulting concentration of the blood, a fall in the blood pressure and a decrease in the bleeding volume.

While the condition of surgical shock is not considered the entire explanation of the deaths of experimental animals, the shock is of such a degree as to make the animals easy victims to bacterial or toxic factors that would be less harmful to normal animals.

SWIFT KARY, M.D.

### MISCELLANEOUS

Gretve S. *Morphologic and Animal Experiment Studies on the Relief of the Mucosa of the Gastro Intestinal Canal. A Contribution on the Anatomic Substrate of the Mucosal Relief and the Mechanism of Formation of Rugae.* (Morphologische und tierexperimentelle Studien ueber das Schleimhautrelief des Magen-Darmkanals. Beitrag zur Kenntnis der anatomischen Unterlage des Schleimhautreliefs und des Mechanismus der Faltenbildung.) *Acta radiol.* 1936 Suppl. 31

The high relief in sections of the stomach and intestines fixed by the intra arterial injection of formalin corresponds to the arrangement of the relief during life provided the fixation does not occur immediately after death. In the exposed gastric mucosa of animals the flat relief is little apparent but after death it often becomes more distinct.

In the human gastro intestinal tract the structure of the submucous connective tissue and the arrangement of the blood vessels in this tissue show no local differences which might determine the localization

of the mucosal folds to any noteworthy degree. Neither is it likely that the structure of the muscularis mucosae and of the rest of the mucosa causes preformation of the folds.

The mucous membrane tube in the stomach and intestines possesses a great capacity to stretch when these organs are well filled during life. In the reduction of the mucosal surface when a markedly filled organ is emptied the muscularis mucosae becomes active.

Observations of the relief of the mucosa of the stomach in living animals show that the appearance of the high relief in association with variations in the form of the organ and its coarse motor movements is based upon marked functional changes. When the contents of the organ are solid the folds of the mucous membrane adapt themselves to the form of the contents lying against their surfaces. When the stomach is emptied the high relief of the organ returns to a typical arrangement of folds. The form of the high relief is maintained by intimate co-operation of the musculature of the mucosa and the outer wall. Because of the connection between the mucosa and the muscularis propria through the tissue of the submucosa the muscularis propria has an important influence upon the main direction of the folds. The more delicate formation of the individual folds and the details of the fold pattern are a function of the muscularis mucosae.

In the stomachs of living cats variations in the appearance of the high relief could be produced independently of the muscularis propria by the administration of drugs. Two types of reaction could be differentiated: (1) marked accentuation of the fold pattern with thinning and an increase in the height, tortuosity, and number of the folds and (2) a decrease in the height and number of the folds with an increase in their width and disappearance of the windings. The first type is probably related to a general decrease in the tonus of the muscularis mucosae and an increase in the surface of the mucous membrane and the second type to a general increase in the tonus of the muscularis mucosae and a decrease in the surface of the mucous membrane.

In animals both during life and after death a somewhat greater water content was found in the fold bearing area than in the smooth portions of the gastric wall. This greater content depends partially upon the presence of a greater amount of mucosa and submucosa which together have a somewhat greater water content than the musculature. Whether it depends also upon an active displacement of fluid could not be demonstrated. Neither was it possible to determine from the animal experiments cited whether greater local displacements of fluid occur during the formation of the folds in the normally functioning gastro-intestinal canal.

Local differences in the blood filling of the capillaries of the mucosa or submucosa within the folds of the high relief on the one hand and in the smooth portions lying between them on the other could not be demonstrated in animals by means of intravital

injections and staining of the blood corpuscles. As the capillaries of the submucosa are relatively few, they probably play no part in the coarsely macroscopic formation of the folds by variations in their content of blood. However, certain observations suggest that local differences in the blood filling of the superficial capillary network of the mucosa contribute to the formation of the flat relief and micro relief.

The results of the reported investigation indicate that the high relief of the mucosa is not anatomically preformed. Neither is its form maintained purely passively by wrinkling of the mucosa when the outer muscle tube contracts. The formation of folds represents an active functional adaptation of the mucous membrane partly to the variations in the surface and form of the outer wall of the organ and partly to the contents of the organ, as the result of which the folds assume a form meeting the requirements of digestion.

LOUIS NEUWELT, M D

Minnucci Del Rosso, L., and Passerini, L. Statistical and Anatomicopathological Considerations Based on 67 Cases of Abdominal Lesions (Considerazioni statistiche ed anatomicopatologiche su 67 casi di lesioni addominali). *Clin chir.*, 1936, 12, 583.

The authors studied 67 cases of severe traumatic lesions of the abdomen with regard to the cause and mechanism of production of the lesions and the anatomicopathological changes. Lesions of the small intestine were found in 43.3 per cent, lesions of the liver in 37.3 per cent, lesions of the spleen in 31.3 per cent, lesions of the stomach, kidneys, and suprarenals in 17.9 per cent, lesions of the mesentery in 13.4 per cent, lesions of the colon in 10.4 per cent, and lesions of the urinary bladder, appendix and duodenum in about 3 per cent. In the 1 case of injury

of the aorta there was a transverse laceration at the level of the celiac axis. This was about 4 cm long and involved practically the entire posterior and lateral segment of the vessel. At some points it extended into the intima and the more internal layers of the media, and at others into the adventitia. Two centimeters lower there was transverse laceration about 1½ cm long in the posterior segment of the vessel, which was limited to the intima and the more internal layers of the media. At the level of these lacerations there was a bloody infiltration of the periaortic tissues.

The vulnerability of the small intestine is related to the volume of this part of the intestinal tract and its location near the abdominal wall. The high incidence of traumatic lesions of the liver and spleen is also due to the anatomical location of the organs.

The authors classified the observed lesions into contusions and lacerations. The incidence of laceration of the liver was 29.5 per cent, that of laceration of the spleen, 28.3 per cent, and that of laceration of the small intestine 25.3 per cent. The frequency of laceration of the liver is explained by the anatomical position of the organ, the friability of its parenchyma, and its large volume. The ratio between contusions and lacerations of the liver was 1.5. Of 21 lesions of the spleen, 10 were lacerations and only 2 were contusions. In the stomach there was 1 laceration to 10 contusions. In the small intestine the numbers of contusions and lacerations were about equal. It may be said that lacerations are more frequent than contusions in solid organs, and contusions more frequent than lacerations in hollow organs.

It was found also that hepatic lesions were often associated with gastric lesions and splenic lesions with lesions of the homolateral kidney and the left colon, whereas intestinal lesions were almost always isolated.

RICHARD E. SOMMA, M D

lumen of the duct remained unchanged. In a dog examined twelve months after cholecystectomy with destruction of the cystic duct a small dilatation about 2 cm in volume which represented a new gall bladder was found. The common duct was equally dilated in all of the animals.

The microscopic changes were also similar in all of the animals. In those which were sacrificed after three and six months the cystic and common ducts were lined with only small patches of cells which were flat and atrophied. In the other animals no trace of a lining epithelium remained. In all of the animals there was a definite fibrous tissue thickening of the submucosa with a tendency toward sclerosis, and the muscular layers were flattened and atrophied.

A. Louis Koss, M.D.

Harkins H N, Harmon P H and Hudson J  
Lethal Factors in Bile Peritonitis I Surgical Shock. *Arch Surg* 1936 33 376

The 2 factors hitherto cited most frequently in the literature as important in the production of death in bile peritonitis were the toxic action of absorbed bile and the effects of anaerobic bacteria.

The authors present experimental data which indicate that another important lethal factor is the changes commonly found accompanying so called secondary surgical shock. The mechanism of production of this surgical shock includes the escape of considerable amounts of plasma like fluid into the peritoneal cavity with resulting concentration of the blood, a fall in the blood pressure and a decrease in the bleeding volume.

While the condition of surgical shock is not considered the entire explanation of the deaths of experimental animals the shock is of such a degree as to make the animals easy victims to bacterial or toxic factors that would be less harmful to normal animals.

SAMUEL KAHN, M.D.

#### MISCELLANEOUS

Gretve S. Morphologic and Animal Experiment Studies on the Relief of the Mucosa of the Gastro Intestinal Canal. A Contribution on the Anatomic Substrate of the Mucosal Relief and the Mechanism of Formation of Rugae. (Morphologische und tierexperimentelle Studien ueber das Schleimhautrelief des Magen Darmkanals. Beitrag zur Kenntnis der anatomischen Unterlage des Schleimhautreliefs und des Mechanismus der Faltenbildung.) *Acta radiol* 1936 Supp 31

The high relief in sections of the stomach and in intestines fixed by the intra arterial injection of formalin corresponds to the arrangement of the relief during life provided the fixation does not occur immediately after death. In the exposed gastric mucosa of animals the flat relief is little apparent, but after death it often becomes more distinct.

In the human gastro intestinal tract the structure of the submucous connective tissue and the arrangement of the blood vessels in this tissue show no local differences which might determine the localization

of the mucosal folds to any noteworthy degree. Neither is it likely that the structure of the muscularis mucosae and of the rest of the mucosa causes preformation of the folds.

The mucous membrane tube in the stomach and intestines possesses a great capacity to stretch when these organs are well filled during life. In the reduction of the mucosal surface when a markedly filled organ is emptied the muscularis mucosae becomes active.

Observations of the relief of the mucosa of the stomach in living animals show that the appearance of the high relief in association with variations in the form of the organ and its coarse motor movements is based upon marked functional changes. When the contents of the organ are solid, the folds of mucous membrane adapt themselves to the form of the contents lying against their surfaces. When the stomach is emptied the high relief of the organ returns to a typical arrangement of folds. The form of the high relief is maintained by intimate cooperation of the musculature of the mucosa and the outer wall. Because of the connection between the mucosa and the muscularis propria through the tissue of the submucosa the muscularis propria has an important influence upon the main direction of the folds. The more delicate formation of the individual folds and the details of the fold pattern are a function of the muscularis mucosae.

In the stomachs of living cats variations in the appearance of the high relief could be produced in dependence of the muscularis propria by the administration of drugs. Two types of reaction could be differentiated: (1) marked accentuation of the fold pattern with thinning and an increase in the height, tortuosity and number of the folds and (2) a decrease in the height and number of the folds with an increase in their width and disappearance of the windings. The first type is probably related to a general decrease in the tonus of the muscularis mucosae and an increase in the surface of the mucous membrane and the second type to a general increase in the tonus of the muscularis mucosae and a decrease in the surface of the mucous membrane.

In animals both during life and after death a somewhat greater water content was found in the fold bearing area than in the smooth portions of the gastric wall. This greater content depends partially upon the presence of a greater amount of mucosa and submucosa which together have a somewhat greater water content than the musculature. Whether it depends also upon an active displacement of fluid could not be demonstrated. Neither was it possible to determine from the animal experiments cited whether greater local displacements of fluid occur during the formation of the folds in the normally functioning gastro intestinal canal.

Local differences in the blood filling of the capillaries of the mucosa or submucosa within the folds of the high relief on the one hand and in the smooth portions lying between them, on the other could not be demonstrated in animals by means of intravital

respond in every detail to the graph of complete tubal occlusion

Under the heading "tubal stenosis" the author combines various forms of partial obstruction of the lumen of the tube such as strictures, kinks, and adhesions. These may produce a variety of different curves, but they all possess one feature in common, namely, absence or marked impairment of tubal contractions. Operative findings have confirmed the clinical deduction that bilateral stenosis or stenosis of one side with complete occlusion on the other produces this type of curve, whereas unilateral stenosis with normal patency on the other side produces a graph indistinguishable from that of normal patency. Patients with tubal stenosis experience more discomfort during the test than any other group. All have more or less pain during the test and some complain specifically of distress on one or both sides of the pelvis which usually ends with termination of the gas injection.

The author is of the opinion that carbon dioxide insufflation should always precede the use of lipiodol, and that lipiodol examinations should be reserved for the small group of cases in which the desired information cannot be obtained by insufflation. He is convinced that careful correlation of the kymographic tracings of the subjective symptoms experienced during the test, together with auscultation and fluoroscopy, usually permit as accurate a forecast of the condition of the tubes as is possible with lipiodol injection.

Increased clinical experience with uterotubal insufflation has shown that this test has some therapeutic value. It may help in the establishment of a greater or more normal degree of patency in cases previously showing signs of partial obstruction. Cases of tubal stenosis in which simple repetition of the test, either immediately or after an interval, reveals an appreciable reduction in the pressure level at which patency becomes manifest are frequently observed. It is possible for an insufflation test to re-establish tubal patency in cases previously showing complete occlusion, but the gas pressure is rarely allowed to rise above 200 mm Hg, and 220 mm Hg is regarded as the absolute maximum, to be employed only exceptionally. This test is invaluable as a routine postoperative procedure following salpingostomy or tubal implantation to determine the patency of the tubes. It is used also at times to maintain or obtain patency in the remaining tube after an operation for unilateral tubal gestation. The author quotes Rubin as stating that in 764 cases which he collected from the literature pregnancy followed so soon after a tubal patency test that the test must be considered an important agent in the treatment of sterility.

GEORGE H. GARDNER, M.D.

Meikle, G. J. Mesodermal Mixed Tumors of the Uterus. *J. Obst. & Gynec. Brit. Imp.*, 1936, 43, 821.

The author reviews the literature on mesodermal mixed tumors of the uterus up to the end of 1933

and reports 3 cases of such tumor. These neoplasms are composed of mixed tissues of mesodermal origin. Their occurrence in the uterus is rare. The mixed tissues of which they are formed are essentially heterotopic to the uterus. The tumors are highly malignant.

**Etiology.** The age incidence of mesodermal mixed tumors of the cervix and of those of the body of the uterus is similar to that of carcinoma at these sites. The tumors of the body of the uterus are most frequent between the ages of fifty and fifty-five years, while those of the cervix occur with about equal frequency throughout the period of menstrual life. The average age of women with a mesodermal mixed tumor of the body of the uterus has been fifty-five years, and that of women with such a tumor of the cervix thirty-one years. Thirty-one per cent of the former and 60 per cent of the latter were nulliparas. Four (6.2 per cent) of the mixed tumors occurred in association with fibroids. All of these were mixed tumors of the body of the uterus. Only 1 mesodermal mixed tumor of the uterus associated with pregnancy has been recorded.

**Pathology.** The ratio of mesodermal mixed tumors of the body of the uterus to such tumors of the cervix is 1.45:1. As a rule mesodermal mixed tumors of the uterus arise from a fairly narrow pedicle, but sometimes those of the body of the uterus have a more diffuse origin. The macroscopic appearance of the neoplasms varies considerably. The cervical growths often assume a botryoid form. They are abortive and composed of grape-like vesicles. They may grow as large as a fetal head at term. Superficial areas of necrosis are common. On section, white, yellow, red, and brown areas are seen. Cystic cavities containing blood and pus are often present. The tumors of the body of the uterus are usually polypoid. They are sometimes single, sometimes multiple. They are usually submucous. The botryoid form of mesodermal mixed tumor is rare in the body of the uterus. Corporal tumors may attain a larger size than cervical tumors. They are firmer than the latter, lobulated or papillary, and often contain cartilage which is visible to the naked eye.

On microscopic examination the tumors are found to be composed of a large number of heterologous elements, the number and relative proportions of which vary in different neoplasms. Most characteristic is a loose connective tissue with a myxomatous appearance. Most observers regard this as embryonic mesenchyme from which the other tissues are derived. Others consider it a true myxoma. It shows star-shaped or triangular cell bodies with long protoplasmic strands running from the points and meeting those of other cells, thus producing a loose network. The cell nuclei are round or oval, and usually single. The intercellular substance is clear or slightly granular. Groups of small round cells resembling lymphocytes have been observed. These may be the most primitive cells present. Spindle cells, similar to the constituent cells of a pure spindle

cell sarcoma, are often seen. In many cases giant cells have been observed. In 14 of 25 cervical tumors and 20 of 42 tumors of the body of the uterus striated muscle was found. Striated fibers are often difficult to discover probably because many of them are only embryonic fibers in which the cross striations are not well developed. Suggestive is the presence of large cells resembling embryonic myoblasts.

One of the most characteristic heterotopic elements is hyaline cartilage. This is immature in type and present in only very small areas. It was noted in 24 of 45 corporeal tumors and 20 of 31 cervical tumors. Osteoid tissue is rare. Fat has been found in a few cases and nerve tissue in 2. Smooth muscle has been observed but this tissue is not heterotopic.

As extreme vascularity is a common feature of the neoplasms hemorrhages into their substance are frequent. A remarkable feature is the completeness of the epithelial covering. The tumors of the body of the uterus are covered with columnar epithelium and those of the cervix with squamous or transitional epithelium. Probably the stroma and epithelium are stimulated to grow by a common factor. This is suggested by the fact that in a number of cases carcinomatous change was noted in the epithelial covering. Glands which closely resemble the normal glands of the endometrium or cervix have been found frequently. They probably represent inclusions. The line of demarcation between the tumor and the uterine wall is usually sharp. When local invasion occurs it is commonly the spindle shaped cells which are the invaders. The malignancy of a particular tumor bears no relation to the amount of local invasion.

**Metastases.** The most common site of secondary deposits is the pelvis. The metastases are often enormous tumors and usually diffuse and amorphous. Frequent sites of metastases are the parametrium, broad ligaments, vagina and peritoneal cavity. Rare sites are the ovaries and pelvic lymph nodes. The most common sites of remote metastases are the lungs and pleura. However, remote metastases are relatively rare as the local recurrence usually kills before they have time to occur. Metastases usually do not reproduce all of the heterologous elements. The picture is commonly that of spindle cell sarcoma or myxosarcoma or both.

**Histogenesis.** The author discusses the histogenesis of the tumors in detail. He regards it as more probable that the heterotopic elements are derived from an undifferentiated embryonic tissue which then undergoes differentiation than that they arise from tissues present in the uterus which have undergone hyperplasia. The described heterotopic elements have been found in the uterus apart from mixed tumors, but under such conditions they have always been present as tumors and have never been in such mixed and intimate contact with other elements as in mixed tumors. When occurring alone they are usually benign. The author reviews the various hypotheses regarding the origin of meso-

dermal mixed tumors of the uterus. According to his theory they arise from cell rests of primitive mesodermal tissue which have been deposited along the line of backward growth of the wolffian ducts. Some of these cells may migrate within the substance of the uterus thus accounting for the position of cells found away from the line of Caetner's ducts. The stimulus to neoplasm formation whatever it may be acts first on the uterine epithelium and usually results in carcinoma formation alone. Occasionally, however it is conveyed to a uterus containing embryonic mesodermal cells and under such conditions both the epithelium and the embryonic mesoblastic tissue are stimulated to grow. The latter grows so fast that the epithelium has no time to develop invasive properties although it grows enough to cover the tumor. Occasionally the epithelium also becomes malignant. The incidence of malignant change in the epithelium is much lower in mesodermal mixed tumors of the uterus than in mixed tumors in other locations.

**Symptoms.** In general the symptoms of mesodermal mixed tumors of the uterus are similar to those of carcinoma at the same sites. The usual signs are bleeding, a foul discharge and the passage of bits of necrotic tissue. Urinary frequency and evidence of the presence of a neoplasm are fairly common.

**Diagnosis.** Clinical diagnosis is often difficult. Mesodermal mixed tumors of the cervix must be distinguished from polyp, hydatid mole and cancer. Those of the body of the uterus must be differentiated from carcinoma sarcoma and fibroids. As a rule microscopic examination is necessary. Even this is not infallible as a single section may suggest sarcoma or miss the growth entirely.

**Treatment.** The results of treatment have been uniformly poor. Only 1 patient having survived operation for five years. On theoretical grounds the author prefers radical hysterectomy with removal of the upper half of the vagina and the regional lymph nodes followed by deep x ray therapy.

In the case reported by Meikle the growth was cervical and botryoid and on microscopic examination showed the following elements: myxomatous tissue, cartilage, spindle cells (like those of sarcoma), giant cells, cells resembling embryonic myoblasts (but no striated muscle), cervical glands and a squamous covering. The patient was still well eighteen months after radical operation.

DANIEL C. MORTON, M.D.

Novak E. and Yui E. The Relation of Endometrial Hyperplasia to Adenocarcinoma of the Uterus. *Am J Obst & Gynec* 1936 32 674

The authors present evidence indicating a relationship of some sort between hyperplasia of the endometrium and corporeal adenocarcinoma. Their study was made in 804 cases of hyperplasia and 104 of adenocarcinoma.

While in the great majority of cases hyperplasia is a definitely benign lesion in a small minority (14

of the 804 cases studied) there is evidence of a marked proliferative tendency which may simulate cancer. The authors discuss the variations in the histological characteristics of benign hyperplasia, the proliferative and pseudo malignant pictures at times encountered (stratification, adenomatous proliferation, marked atypicity of glands, syncytium like epithelial proliferation, squamous metaplasia of gland or surface epithelium). Attention is called to the fact that atypical gland proliferations simulating adenocarcinoma are especially frequent in the polyps so often found with hyperplasia. An interesting finding in the authors' study was that hyperplasia is not rare long after the menopause (40 of the 804 cases). The cause and significance of such hyperplasia are discussed. The occasional occurrence of hyperplasia with bleeding in elderly women lessens the importance of these findings as a sign of granulosa cell carcinoma of the ovary unless an ovarian tumor can be palpated.

In the authors' study of adenocarcinoma the most impressive observation was the presence of a co-existing hyperplasia in fully 25 of the cases in which some of the non cancerous endometrium was available for examination. The fact that the great majority of the women with adenocarcinoma (78 of the 92 whose ages were known definitely) were beyond the age of the menopause suggests that a postmenopausal hyperplasia or, perhaps more accurately, the endocrine dysfunction responsible for it, strongly predisposes to the development of adenocarcinoma. Since persistence and relative excess of estrin is accepted as the cause of hyperplasia, it would seem that it is this endocrine factor which predisposes to the occurrence of cancer. The authors discuss the question of the relationship between estrogenic and carcinogenic substances and the carcinogenic properties of estrogenic substances. Whether the persisting estrin stimulation in cases of postmenopausal hyperplasia serves merely to keep up a form of chronic irritation or whether its carcinogenic effects are more direct and fundamental cannot be answered as yet. However in the light of the findings of recent experimental work the latter appears to be the more probable.

EDWARD L. CORNELL M.D.

Pearson, B. Factors in the Cause of Death in Carcinoma of the Cervix. *Am J Cancer*, 1936, 28, 31.

This article is based on 57 consecutive cases of carcinoma of the cervix coming to autopsy. The most striking and constant finding was stricture of the ureters with consequent hydronephrosis and hydro ureters. Such strictures occurred in 42 (75 per cent) of the cases. Both ureters were involved in 30 (52 per cent). The most common cause of death was uremia which occurred in 19 (33 per cent) of the cases and the next most common cause peritonitis, which occurred in 11 (19 per cent). In 6 cases in which death was due to peritonitis the peritonitis developed from 2 to 5 days after irradiation treat-

ment. The author believes that it was due to the irradiation. Reports in the literature indicate that irradiation may stir up latent infection in the pelvic tissues. In 5 (9 per cent) of the cases reviewed death was due to hemorrhage, and in 5 was attributed to cachexia. In 2 cases the cachexia was due to distant metastases, in 2, to the primary carcinoma, and in 1, to anemia. The other deaths were attributed to a variety of complications such as intestinal obstruction, pyelonephritis, pneumonia, and multiple metastases with ascites, none of which was responsible for more than 2 deaths.

Infection of the urinary tract was found in 13 (22 per cent) of the cases. Pyonephrosis occurred in 6 and pyelonephritis in 12. Bladder infiltration was found in 9, and a vesicovaginal fistula in 4.

Distant metastases were formed in 19 (25 per cent) of the cases. Involvement of the liver occurred in 19 per cent, of the lungs in 9 per cent, and of bones in 7 per cent. A review of the literature revealed a wide variation in the incidence and sites of distant metastases. It is the author's belief that irradiation is not a factor in the development of distant metastases. Local metastases in the pelvis were found in 34 (59 per cent) of the reviewed cases. The vagina was involved locally in 13 (24 per cent). Involvement of the rectum was found in 23 cases. Stricture occurred in 7 and fistula in 8.

The average age of the patients was 47 years and the average duration of the disease 19 months.

DANIEL G. MORTON M.D.

Coutard H. Roentgen Therapy of the Pelvis in the Treatment of Carcinoma of the Cervix. *Am J Roentgenol*, 1936, 36, 603.

This article deals with the technique and results of irradiation employed at the Cure Foundation of Paris in the treatment of carcinoma of the cervix (Stage 3) during the period from 1919 to 1929.

The material is divided into 3 groups according to the progress made in the technical development.

Period from 1919 to 1922. In the cases treated during this period there were no five year cures whether or not roentgen therapy was associated with intracavitary chemotherapy.

Period from 1922 to 1927. After the kilovoltage was decreased to 180 and the dosage doubled by prolonging the duration of the irradiation by from twenty five to forty days the results were improved. The incidence of five year survival in this period ranged from 28 to 30 per cent.

Period from 1928 to 1929. After 1928 further improvement was obtained by Baclesse, the incidence of five year survival being increased to 36 per cent.

The technique used at the present time is a combination of roentgen therapy and intracavitary radium irradiation or roentgen therapy alone. The intracavitary radium is applied by a method which is now fairly well standardized. About 60 mc destroyed are used 30 in the vagina and 30 in the uterus, for an average of six days the dose

amounting to about 8000 mgm hr. Whenever possible the irradiation is begun with roentgen therapy to reduce infection and hemorrhage and the radium is applied immediately after the conclusion of the roentgen therapy. If roentgen therapy is used only the dose is increased by 20 per cent.

The roentgen therapy is generally carried out with 200 kv 4 to 5 ma filtration by mm of copper a skin target distance of from 70 to 90 cm, and an intensity of from 3 to 5 r per minute measured on the skin. The factors pertaining to dosage are governed as follows:

1. Daily dose, total dose, and duration of treatment. The daily dose which is divided into 2 sessions 1 in the morning and 1 in the evening starts at 250 r, is increased after a few days to 300 r and is increased toward the end of the treatment to 400 or even 500 r. There are 11 sessions weekly. The total dose and duration are 10,000 r in five weeks, 12,000 r in six weeks or 14,000 r in seven weeks.

2. Number of fields, size of fields and dose per field. At least 6 fields are used: 2 laterosacral, 2 ilio inguinal and 2 gluteal. To these may be added suprapubic, vulvar, perineal and coccygeal fields. The size of the fields varies from 200 to 350 sq cm according to the patient's weight. The dose per field is about 1000 r if 6 fields are used and less if more than 6 fields are used and some of the fields overlap.

3. Depth dose at the site of the lesion. The depth dose at the site of the lesion varies between 20 and 30 per cent of the skin dose according to the size and weight of the patient. The total dose necessary for sterilization of the lesion is between 3,000 and 4,000 r at the site of the lesion.

4. The rotation of the fields. The fields are irradiated in rotation in order to prevent too much damage to the skin.

5. Complications and reaction. Complications may be early or late. Those occurring early are due to excessive daily doses and those occurring late to excessive total doses. Early complications include a general systemic reaction, intestinal disorders and radioepidermitis. Late complications are seen more rarely. They consist chiefly of chronic induration and telangiectasis of the skin. Fectal and vesical complications occur as a rule only in cases in which intracavitary radium has followed the roentgen irradiation.

T. FLETCHER, M.D.

Goodall J. R. Total Versus Subtotal Hysterectomy. *Am J Obst & Gynec* 1936 32 628

There are advantages and disadvantages to each of the 2 types of hysterectomy. The disadvantages of total as compared with subtotal hysterectomy are: (1) a greater amount of time required for performance of the operation, (2) greater skill required, (3) greater loss of blood, (4) greater danger to vital organs and (5) greater difficulty if the pelvic organs are fixed deeply in the pelvic cavity or the patient is obese. The advantages are: (1) fewer immediate

postoperative complications, (2) fewer remote sequelae and (3) smoother recovery.

The average difference between the time required to perform a subtotal hysterectomy and that required to perform a total hysterectomy is between five and fifteen minutes, which is a negligible factor in the average case. The skill required to perform the total operation can be acquired from experience. In general total hysterectomy is easier in the parous than in the nulliparous. In the average case the difference in the blood loss in the 2 types of operation is negligible but occasionally especially in hemorrhagic cases and those in which a clamp or suture fails it may be considerable. About 70 per cent of patients subjected to total hysterectomy as compared with 45 per cent of those subjected to subtotal hysterectomy void spontaneously after the operation. As primary hemorrhage occurred in none of 550 cases of total hysterectomy, the 2 operations are about equal with respect to this complication. In the reviewed cases thrombophlebitis was 3 times more frequent after subtotal hysterectomy than after total hysterectomy. This may be explained by the fact that the general agent of thrombophlebitis is an infection of low virulence which in the vast majority of cases emanates from a mucosal disease of a type frequent in the cervix.

Subtotal hysterectomy is often followed by disappointing late sequelae. In a considerable percentage of the authors' cases it was followed by leucorrhoea which had not been present previously. In many cases endocervicitis and ectropion requiring treatment develop after the operation.

It is not a matter of indifference whether the ovaries are allowed to remain since with their removal the incidence of late cervical disease is greatly reduced and the incidence of immediate and intermediate postoperative hemorrhage is decreased especially in patients with vascular instability. Moreover late recurrence of bleeding from the stump is practically unknown after total removal of the ovaries except in cases of neoplasia.

J. DWYER L. CORNELL, M.D.

#### ADNEXAL AND PERIUTERINE CONDITIONS

Schmidt K. The Pathology and Clinical Course of 10 Cases of Primary Tubal Carcinoma (*Pathologie und Klinik von 10 Fällen von primärem Tubercarcinoma*). *Zucker f. Geburtsh & Gynäk* 1936 112 339.

Since the collection of Haupt 10 additional cases of primary tubal carcinoma have been reported. There to a number recorded to date is therefore 339.

The author reports 10 new cases which have come under observation in the Stoeckel Clinic during the last nine years. The average age of the patients was forty eight years. The diagnosis was never made correctly before operation as the symptoms are not characteristic. In 6 cases the presence of cancer was not recognized even at operation. Therefore in cases of large inflamed adnexal tumors in the

climacteric age radical removal of the genitalia is advisable. The prognosis of tubal carcinoma is generally poor recurrence is frequent. Of the author's patients, 1 is free from recurrence after seven and one half years, 2 are well after three years, and 3 are well after two years. In the others the condition ran an unfavorable course.

The pathologico-anatomic diagnosis presents no difficulties. However, tuberculous adenosarcoma sometimes produces a picture which suggests carcinoma, and malignancy may develop on the basis of tuberculosis. In 6 of the cases reported by the author metastases already existed at the time of operation. In 1 case there was a squamous epithelial carcinoma of the uterine cervix in addition to the tubal carcinoma. This was a case of separate cancers developing simultaneously, therefore a case of multiple primary carcinoma.

(FRA. LE.) DANIEL G. MORTON, M.D.

Lynch, F. W. A Clinical Review of 110 Cases of Ovarian Carcinoma. *Am. J. Obst. & Gynec.* 1936, 32: 753.

Of the 110 patients with ovarian carcinoma whose cases are reviewed by the author two thirds were between forty and sixty years of age. Forty per cent gave a history of cancer in other members of the family. Twelve per cent had never been married, and 31 per cent of those who were married had never been pregnant.

A five year cure was obtained only in cases in which the malignant areas were encapsulated by a cyst wall or the tumor was of low malignancy.

Lynch is of the opinion that the value of present day therapy cannot be determined without a follow up for at least ten years during which period the patient is not retreated. He believes that the curative effect of roentgen ray therapy on ovarian tumors has been greatly overestimated.

In the discussion of this report, KIMBROUGH said that he had found histological grading of little or no value in determining the prognosis of ovarian carcinomas and therefore depends entirely upon the gross extent of the lesion in predicting the chance of cure.

HEALY stated that in his opinion preoperative roentgen irradiation is important. The results are poorest in the cases of patients who have been operated upon by surgeons who have torn widely into the tumor tissue, opened up lymphatic and blood spaces, and left a lot of cancer tissue. Healy is now teaching that when a malignant tumor of the ovary is suspected in a woman more than forty years of age, irradiation treatment should be given and operation delayed for several months.

ADAIR said that he found it very difficult to determine what may be expected from either irradiation or operation. In many cases in which he had expected the results to be good they were disastrous and vice versa.

LITZENBERG reported that, of 108 patients treated for ovarian carcinoma, nearly 33 per cent were well

five years, and some of them nine years, later. His treatment consists of removal of the cyst followed by deep x ray therapy. EDWARD J. CORNELL, M.D.

## EXTERNAL GENITALIA

Den Hoed, D. Results of Treatment of Malignant Tumors of the Vagina, Vulva, and Urethra (Resultate der Behandlung bösartiger Geschwülste von Scheide, Vulva und Harnleiter). *Nederl. Tijdschr. v. Geneesk.* 1936, p. 1804.

In the period from 1915 to 1932, 31 women with vaginal carcinoma, 41 with vulval carcinoma, and 16 with urethral carcinoma were treated at the clinic of the Cancer Institute in Amsterdam. The author reviews the indications, method, and results of the treatment in detail.

Vaginal carcinoma was always treated with radium, sometimes in combination with roentgen therapy and electrocoagulation. Cure resulted in 22 per cent of the cases.

In the cases of vulval carcinoma extirpation was done with the diathermy needle and subsequent radium irradiation was given. Only suspicious glands in the region of the groin were removed surgically. Inoperable tumors were irradiated. Cure resulted in 29 per cent.

Urethral carcinoma was always irradiated, the smaller areas with radium, the larger ones with the x rays. Cure was obtained in 31 per cent of the cases.

Before 1929, a total of 58 patients were treated. Of these 11 (19 per cent) were cured. Since 1929, 30 were treated. Of these 13 (43 per cent) were well after five years.

(DE SLOO.) DANIEL G. MORTON, M.D.

## MISCELLANEOUS

Brady, L. A Further Study of Extraperitoneal Pelvic Conditions in Women. *Am. J. Obst. & Gynec.* 1936, 32: 577.

The great majority of extraperitoneal pelvic conditions in women follow induced abortions or operative deliveries in the presence of infection. As a rule there is a history of low abdominal pain, chills, and excessive bleeding. Gastrointestinal symptoms are rare. Some patients experience pain on walking and hold the thigh flexed and adducted because of spasm of the psoas muscle. In a typical case the temperature and leucocyte count are both high and an abdominal mass can be felt just above Poupart's ligament. In many cases the history and physical findings are not typical and it is easy for the surgeon to mistake a broad ligament abscess for an intraperitoneal condition.

All extraperitoneal infections should be drained extraperitoneally. Better results are obtained by draining broad ligament abscesses extraperitoneally through a low McBurney incision (the inguinal route) than by attempting to drain them through the vagina without entering the peritoneal cavity.



amounting to about 8000 mgm br. Whenever possible the irradiation is begun with roentgen therapy to reduce infection and hemorrhage and the radium is applied immediately after the conclusion of the roentgen therapy. If roentgen therapy is used only the dose is increased by 50 per cent.

The roentgen therapy is generally carried out with 200 kv. 4 to 5 ma. filtration by 2 mm. of copper a skin target distance of from 70 to 90 cm. and an intensity of from 3 to 5 r per minute measured on the skin. The factors pertaining to dosage are governed as follows:

1. Daily dose, total dose and duration of treatment. The daily dose which is divided into 2 sances 1 in the morning and 1 in the evening starts at 250 r. is increased after a few days to 300 r and is increased toward the end of the treatment to 300 or even 350 r. There are 11 sances weekly. The total dose and duration are 10 000 r in five weeks, 11 000 r in six weeks or 14 000 r in seven weeks.

2. Number of fields, size of fields and dose per field. At least 6 fields are used: 2 laterosacral, 2 ilio-inguinal and 2 gluteal. To these may be added suprapubic, vulval, perineal and coccygeal fields. The size of the fields varies from 200 to 350 sq. cm. according to the patient's weight. The dose per field is about 1000 r if 6 fields are used and less if more than 6 fields are used and some of the fields overlap.

3. Depth dose at the site of the lesion. The depth dose at the site of the lesion varies between 20 and 40 per cent of the skin dose according to the size and weight of the patient. The total dose necessary for sterilization of the lesion is between 3 000 and 4 000 r at the site of the lesion.

4. The rotation of the fields. The fields are irradiated in rotation in order to prevent too much damage to the skin.

5. Complications and reaction. Complications may be early or late. Those occurring early are due to excessive daily doses and those occurring late to excessive total doses. Early complications include a general systemic reaction, intestinal disorders and radio-epidermitis. Late complications are seen more rarely. They consist chiefly of chronic induration and telangiectasis of the skin. Rectal and vesical complications occur as a rule only in cases in which intracavitary radium has followed the roentgen irradiation. T. LEECH, M.D.

Goodall J. R. Total Versus Subtotal Hysterectomy. *Am. J. Obst. & Gynec.* 1936 31 615.

There are advantages and disadvantages to each of the 2 types of hysterectomy. The disadvantages of total as compared with subtotal hysterectomy are: (1) a greater amount of time required for performance of the operation, (2) greater skill required, (3) greater loss of blood, (4) greater danger to vital organs, and (5) greater difficulty if the pelvic organs are fixed deeply in the pelvic cavity or the patient is obese. The advantages are: (1) fewer immediate

postoperative complications, (2) fewer remote sequelae, and (3) smoother recovery.

The average difference between the time required to perform a subtotal hysterectomy and that required to perform a total hysterectomy is between five and fifteen minutes, which is a negligible factor in the average case. The skill required to perform the total operation can be acquired from experience. In general total hysterectomy is easier in the parous than in the nulliparous. In the average case the difference in the blood loss in the 2 types of operation is negligible but occasionally, especially in hemorrhagic cases and those in which a clamp or suture fails it may be considerable. About 70 per cent of patients subjected to total hysterectomy as compared with 45 per cent of those subjected to subtotal hysterectomy void spontaneously after the operation. As primary hemorrhage occurred in none of 550 cases of total hysterectomy, the 2 operations are about equal with respect to this complication. In the reviewed cases thrombophlebitis was 3 times more frequent after subtotal hysterectomy than after total hysterectomy. This may be explained by the fact that the general agent of thrombophlebitis is an infection of low virulence which in the vast majority of cases emanates from a mucocutaneous disease of a type frequent in the cervix.

Subtotal hysterectomy is often followed by disappointing late sequelae. In a considerable percentage of the author's cases it was followed by leucorrhea which had not been present previously. In many cases endocervicitis and ectropion requiring treatment develop after the operation.

It is not a matter of indifference whether the ovaries are allowed to remain since with their removal the incidence of late cervical disease is greatly reduced and the incidence of immediate and intermediate postoperative hemorrhage is decreased especially in patients with vascular instability. Moreover late recurrence of bleeding from the stump is practically unknown after total removal of the ovaries except in cases of new growth.

LEONARD L. CORSELL, M.D.

#### ADNEKAL AND PERIUTERINE CONDITIONS

Schmidt K. The Pathology and Clinical Course of 10 Cases of Primary Tubal Carcinoma (Pathologie und Klinik von 10 Fällen von primärem Tubercarcinom). *Ztschr. f. Geburtsh.* 1936 6 1936 212 339.

Since the collection of Haupt 10 additional cases of primary tubal carcinoma have been reported. The total number recorded to date is therefore 331.

The author reports 10 new cases which have come under observation in the Stoeckel Clinic during the last nine years. The average age of the patients was forty eight years. The diagnosis was never made correctly before operation as the symptoms are not characteristic. In 6 cases the presence of cancer was not recognized even at operation. Therefore in cases of large inflamed adnexal tumors in the

climacteric age radical removal of the genitalia is advisable. The prognosis of tubal carcinoma is generally poor, recurrence is frequent. Of the author's patients, 1 is free from recurrence after seven and one half years, 2 are well after three years, and 3 are well after two years. In the others the condition ran an unfavorable course.

The pathologic anatomic diagnosis presents no difficulties. However, tuberculous adenosarcoma sometimes produces a picture which suggests carcinoma, and malignancy may develop on the basis of tuberculosis. In 6 of the cases reported by the author metastases already existed at the time of operation. In 1 case there was a squamous epithelial carcinoma of the uterine cervix in addition to the tubal carcinoma. This was a case of separate cancers developing simultaneously therefore a case of multiple primary carcinoma.

(FRANKL) DANIEL G. MORTON, M.D.

Lynch, F. W. A Clinical Review of 110 Cases of Ovarian Carcinoma. *Am J Obst & Gynec*, 1936, 32: 753.

Of the 110 patients with ovarian carcinoma whose cases are reviewed by the author, two-thirds were between forty and sixty years of age. Forty per cent gave a history of cancer in other members of the family. Twelve per cent had never been married, and 31 per cent of those who were married had never been pregnant.

A five year cure was obtained only in cases in which the malignant areas were encapsulated by a cyst wall or the tumor was of low malignancy.

Lynch is of the opinion that the value of present day therapy cannot be determined without a follow-up for at least ten years, during which period the patient is not re-treated. He believes that the curative effect of roentgen ray therapy on ovarian tumors has been greatly overestimated.

In the discussion of this report KIMBROUGH said that he had found histological grading of little or no value in determining the prognosis of ovarian carcinomas and therefore depends entirely upon the gross extent of the lesion in predicting the chance of cure.

HEALY stated that in his opinion pre-operative roentgen irradiation is important. The results are poorest in the cases of patients who have been operated upon by surgeons who have torn widely into the tumor tissue, opened up lymphatic and blood spaces, and left a lot of cancer tissue. Healy is now teaching that when a malignant tumor of the ovary is suspected in a woman more than forty years of age, irradiation treatment should be given and operation delayed for several months.

ADAIR said that he found it very difficult to determine what may be expected from either irradiation or operation. In many cases in which he had expected the results to be good they were disastrous and vice versa.

LITZENBERG reported that, of 108 patients treated for ovarian carcinoma, nearly 33 per cent were well

five years, and some of them nine years, later. His treatment consists of removal of the cyst followed by deep x-ray therapy. EDWARD I. CORNELL, M.D.

## EXTERNAL GENITALIA

Den Hoed, D. Results of Treatment of Malignant Tumors of the Vagina, Vulva, and Urethra (*Resultate der Behandlung bösartiger Geschwülste von Scheide, Vulva und Harnleiter*). *Nederl Tijdschr v Geneesk*, 1936, p. 1804.

In the period from 1915 to 1932, 31 women with vaginal carcinoma, 41 with vulval carcinoma, and 16 with urethral carcinoma were treated at the clinic of the Cancer Institute in Amsterdam. The author reviews the indications, method, and results of the treatment in detail.

Vaginal carcinoma was always treated with radium, sometimes in combination with roentgen therapy and electrocoagulation. Cure resulted in 22 per cent of the cases.

In the cases of vulval carcinoma extirpation was done with the diathermy needle and subsequent radium irradiation was given. Only suspicious glands in the region of the groin were removed surgically. Inoperable tumors were irradiated. Cure resulted in 29 per cent.

Urethral carcinoma was always irradiated, the smaller areas with radium, the larger ones with the x-rays. Cure was obtained in 31 per cent of the cases.

Before 1929, a total of 58 patients were treated. Of these 11 (19 per cent) were cured. Since 1929, 30 were treated. Of these 13 (43 per cent) were well after five years.

(DE SNOO) DANIEL G. MORTON, M.D.

## MISCELLANEOUS

Brady, L. A Further Study of Extraperitoneal Pelvic Conditions in Women. *Am J Obst & Gynec*, 1936, 32: 577.

The great majority of extraperitoneal pelvic conditions in women follow induced abortions or operative deliveries in the presence of infection. As a rule there is a history of low abdominal pain, chills, and excessive bleeding. Gastrointestinal symptoms are rare. Some patients experience pain on walking and hold the thigh flexed and adducted because of spasm of the psoas muscle. In a typical case the temperature and leucocyte count are both high and an abdominal mass can be felt just above Poupart's ligament. In many cases the history and physical findings are not typical and it is easy for the surgeon to mistake a broad ligament abscess for an intra-peritoneal condition.

All extraperitoneal infections should be drained extraperitoneally. Better results are obtained by draining broad ligament abscesses extraperitoneally, through a low McBurney incision (the inguinal route) than by attempting to drain them through the vagina without entering the peritoneal cavity.

Extraperitoneal drainage should be instituted as soon as the diagnosis is made. There is no advantage in delaying operation until the inguinal mass becomes larger.

The organism most frequently cultured in cases of extraperitoneal pelvic infection is the streptococcus. The author believes that in many of the cases in which the cultures were reported negative anaerobic streptococci were present and if special culture methods had been used positive cultures would have been obtained. In many cases of broad ligament abscess the pus is not clear and watery, as might be expected but thick, yellow, and foul smelling.

Although many of the patients whose cases are reviewed by the author were desperately ill when operated on there was no operative mortality. All of the women operated on left the hospital apparently well.

Extraperitoneal pelvic infections do not decrease fertility but it seems to be dangerous for a woman who has had a broad ligament abscess to become pregnant at once. Of 2 women who conceived six weeks after leaving the hospital both had puerperal septicemia and 1 of them died. Except for the danger associated with conception occurring soon after operation broad ligament abscesses apparently do not affect the health of the patient after the pus has been evacuated and the temperature has returned to normal.

The author reports 4 cases in detail and describes other extraperitoneal lesions, viz. urachal myoma, infection of an ectopic kidney, mesenteric cyst, and retroperitoneal chylous cyst.

EDWARD L. CORNELL M.D.

Fullerton, H. W. Anemia in Poor Class Women.  
*Brit. M. J.* 1936 2 533

Fullerton made a study of the hemoglobin level of 819 pregnant women and 715 non pregnant women belonging to the poorest class living in Aberdeen. In both groups the average hemoglobin values were considerably below the normal level of 68 per cent (100 per cent = 13.8 gm.) reported by Price Jones. It was so and that the hemoglobin decreased from the age of puberty to the age of the menopause. Between the ages of 40 and 44 years its average level was about 76 per cent in the non pregnant women and 74 per cent in the pregnant women. After the age of 44 years it increased and between the ages of 55 and 65 years it was 88 per cent. Of the entire number of non pregnant women 16 per cent and of the entire number of pregnant women, 17.5 per cent had hemoglobin values below 70 per cent.

Available evidence suggested that dietary deficiency and menstrual blood loss were important factors in the development of the iron deficiency anemia. The author discusses the quantitative iron exchange in relation to diet, pregnancy and menstruation. He states that menstruation causes a loss of iron at least as great as that resulting from pregnancy and lactation. The findings of his study suggest that the iron intake of women in the child

bearing period is frequently inadequate to meet the demands of menstruation and reproduction.

HOWARD L. ALT, M.D.

Koller, T. The Problem of Bacterial Virulence in Obstetrics and Gynecology. (Das Problem der Bakterienvirulenz auf gynäkologisch-geburtshilflichem Gebiet.) *Arch. f. Gynaek.*, 1936 162 53

The practical importance of the Lamer and Ruge-Philipp virulence tests was investigated in 8,000 such tests made in obstetrical and gynecological cases. The technique is described and the results are reported in detail. The reliability of pre-operative virulence determinations in vaginal and abdominal gynecological operations (exclusive of those for carcinoma) was investigated in 1,680 cases and the postoperative results were compared with those of 822 similar gynecological operations performed in cases in which the vaginal secretion was free from streptococci and staphylococci.

According to both pre-operative tests, inflammatory complications occurred very rarely and with approximately the same frequency (1.1 and 1.7 per cent). The investigations on patients with carcinoma (59 treated by surgery and 113 treated with radium) showed that after total surgical extirpation as well as intracervical radium treatment inflammatory reactions were more frequent when the tests for bacterial virulence were positive. In a study of the late results after several years it was found that among the women still living there were a large number who had had no complications after operation or no prolonged elevations of the temperature during intracervical radium treatment.

Virulence determinations during pregnancy during labor and in the puerperium in 270 cases of spontaneous delivery and 44 cases of operative delivery showed a noteworthy agreement between the virulence of the bacteria and infectious complications in the puerperium.

The results in cases of inflammation and especially in septic conditions showed that the Ruge-Philipp virulence test is of only slight practical value for determining the severity of the illness and its prognosis. In contrast to others Koller believes that this inadequacy is not due to failure of the test since in the reviewed cases as a whole the test was found to give satisfactory results within certain definite limits. What is incorrect is the assumption that by determination of the virulence of the bacteria in the cervical and vaginal secretions the virulence in distant inflammatory foci may be estimated. This is evident from the cases of fatal septic thrombophlebitis in eight months of which tests for virulence of the aerobes and anaerobes in the vaginal secretion were negative. Only when cultures from the same patient are obtained on different days and from inflammatory foci in the immediate vicinity of the infection is it possible to obtain important data for judgment of the severity of the condition.

(POSSENBECK) JACOB E. KLEIN M.D.

Albrecht Sterility, Periodic Fertility, and Infertility (Sterilität, periodische Fruchtbarkeit und Unfruchtbarkeit) *Arch f Gynaek*, 1936, 161 23

This is a report presented by the author at the meeting of the German Gynecological Society at Munich in 1935. It is based upon 3 questions:

1. How long is the power of impregnation retained by the spermatozoa and ova?

2. When does ovulation occur in the cycle and how long does the function of the corpus luteum last?

3. Is it possible definitely to predetermine the duration of the individual menstrual cycle?

In answer to the first question the author states that the impregnating power of the spermatozoa depends upon the temperature of their surroundings. When the temperature is low it lasts longer. The reason for this is that in higher temperatures the kinetic energy of the spermatozoa is liberated more rapidly and earlier and, with it, also the power of impregnating. Therefore, the longer this energy is restrained, the longer the power of impregnating persists. The power of impregnating ceases much sooner than the motility of the spermatozoa. The former ceases on the third or fourth day, and the latter only on the twelfth day after deposition of the spermatozoa in the genital canal. The possibility of impregnation of the ovum after rupture of the follicle lasts for forty-eight hours. Therefore the period of impregnation is limited for both of the germinal cells. In spite of this temporal limitation, propagation is assured by (1) the stimulus of copulation arising from the nervous sexual center in the midbrain which leads to an increased excretion of prolactin and therefore accelerated maturation and

rupture (provoked ovulation) of the follicle, and (2) temporally fixed ovulation in relationship with the development of estrus.

In answer to the second and third questions the author states that the time of ovulation cannot be determined mathematically. The period may vary as much as ten days, and the process reaches its peak about fifteen days before the onset of menstruation. During the time that the corpus luteum functions no other ovum can mature. The corpus luteum functions for about two weeks after rupture of the follicle. This fact explains the variation in the time during which impregnation may occur.

Conception is most apt to occur during the period of spontaneous ovulation, that is, from the twelfth to the sixteenth day before menstruation. However, it may occur also during the so-called "infertile days," after and before menstruation. According to Knaus, the reason for this lies in the great variation of the menstrual period which can never be determined beforehand. Consequently, the view held heretofore that the menstrual cycle is very constant is incorrect.

The author concludes that during the menstrual cycle there is a biological regularity in the alternation of fertile and infertile days. The fertile days extend from the twelfth to the sixteenth day previous to the next menstruation. However accurate calculation of the infertile days is impossible because of the incalculable variations and changes in the phases of the menstrual cycle caused by early and late ovulation. It is evident therefore that, in some cases of sterility, successful results may follow the timely regulation of cohabitation.

(F. SIGERT) LOUIS NEUBELT M.D.

# OBSTETRICS

## PREGNANCY AND ITS COMPLICATIONS

Harer W B A Study of 1,000 Placentas *Am J Obst & Gynec* 1936 32 794

The placentas of 1,000 white women delivered after the twenty sixth week of pregnancy were examined grossly in the fresh state within twenty four hours and the abnormalities found were studied microscopically

A high incidence of pathological changes in the placentas from a group of women with an unusually low incidence of clinical abnormalities led to the conclusion that such changes must be considered senile degenerative changes taking place in an organ with a life span barely sufficient for proper performance of its physiological function

Placental changes found in cases of late gestational toxemia are identical with but occur more frequently and are more extensive than those found in clinically normal pregnancy The maternal toxemia must therefore be regarded simply as an additional source of injury to an organ already undergoing the changes incident to senility

Placental infarcts of the fetal type are due to degeneration of the syncytial cells of the chorionic villi with the deposition of fibrin masses around the villi The fibrin masses interfere with the function of the villi thereby causing endarteritis thrombotic and necrosis of the villi affected An unusual type of low grade inflammatory reaction occurs around and within the affected tissue and forms the so called white infarct of the placenta Placental infarcts of the maternal variety are due to degenerative changes in the decidua in which because of its highly vascular nature hemorrhage is the most characteristic pathological change The walling off and eventual fibrosis of the area form the so called red infarct of the placenta

The condition known as 'placentalosis' was found in nearly 25 per cent of the placentas studied In no case was there any clinical evidence of its presence It was apparently without effect upon either the mother or the child The author therefore concludes that this condition is a simple passive congestion of the placenta which in most cases occurs late in labor or after the birth of the child

EDWARD L CORNELL, M D

Adair F L Dieckmann W J and Grant A Anemia in Pregnancy *Am J Obst & Gynec* 1936 32 560

In pregnancy the average hemoglobin concentration is 11.56 gm per 100 c cm of blood, the average cell volume 37.31 volume per cent and the average erythrocyte count 3.77 millions The minimum standards in normal pregnancy are hemoglobin 10 gm per 100 c cm cell volume 33 volume per cent and erythrocyte count 3.36 million

Of 7,412 pregnant women whose cases are reviewed by the authors, 11.6 per cent had anemia according to the authors standards, but if the standards for non pregnant women are used, 63.2 per cent were anemic

Normally variations occur in the hemoglobin, cell volume and erythrocyte count during pregnancy These changes cannot be altered by treatment In the hemoglobin, a variation of as much as 6 gm may occur in a period of from four to six weeks Because of these marked fluctuations caution is necessary in attributing an increase in the hemoglobin cell volume, and erythrocyte count to previous therapy

In anemia an adequate amount of transfused blood will raise the hemoglobin concentration to normal permanently and relieve all symptoms and signs due to anemia Blood transfusion during pregnancy if done properly has no deleterious effect on the mother or the fetus It has not caused premature labor

The prevention of anemia of pregnancy is easier than its cure An adequate diet with proper hygiene is the best prophylaxis When the blood is normal toxemia is less likely to occur blood loss and the strain of labor are better tolerated the resistance of the tissues is greater there is less danger of infection and recovery after delivery is more rapid

EDWARD L CORNELL, M D

Smallwood W C The Anemia of Pregnancy *Bull N Y* 1936 2 373

The anemias of pregnancy are classified by the author as follows

- A Physiological anemia of pregnancy—hypochromia
- B Deficiency or anhematopoietic anemia
  - 1 Deficiency of iron (microcytic hypochromic anemia)
    - (a) Hypochromic anemia induced by pregnancy
    - (b) Idiopathic hypochromic (Witt's) anemia complicated or precipitated by pregnancy
  - 2 Deficiency of the liver factor (macrocytic anemia)
    - (a) Deficiency of an extrinsic factor Tropical macrocytic anemia complicated or induced by pregnancy
    - (b) Deficiency of an intrinsic factor (1) true Addisonian pernicious anemia complicated or precipitated by pregnancy (2) pseudo pernicious anemia of pregnancy
- C Erythronoclastic (hemolytic) anemia
  - 1 Plastic
  - 2 Hypoplastic
  - 3 Aplastic

- D Post-hemorrhagic anemia
  - 1 Antepartum hemorrhage
  - 2 Postpartum hemorrhage
- E The anemia of puerperal sepsis
- F Other anemias complicated by pregnancy
  - Streptococcal and staphylococcal septicemia, malignant disease, leukemia, nephritis, familial hemolytic icterus, malaria, etc

This article deals only with blood deficiencies which are apparently due to, and aggravated by, pregnancy.

**Physiological Anemia—Hydremia** During pregnancy the total blood volume is increased, the red cells and hemoglobin by about 20 per cent and the plasma by 25 per cent or more. Consequently, although the total amount of circulating blood, cells, and hemoglobin is increased, the blood is more dilute and counts disclose an apparent anemia. However, it is doubtful whether hydremia, *per se*, is ever responsible for a fall in the hemoglobin below 70 per cent.

**Deficiency or anhematopoietic anemia** In cases of this type of anemia iron deficiency or microcytic hypochromic anemia is by far the most common and the most important. The red count may be normal or diminished, but as the reduction in the hemoglobin is relatively greater the color index is below 1 and may even reach .4.

Iron deficiency is probably caused by alteration in the metabolism of iron due to the increased iron requirements of the mother and the fetus, insufficient iron in the mother's diet, or a decrease in the absorption of iron due to gastrointestinal abnormalities. There is little doubt that in the cases of women of the poorer classes the diet is often deficient in iron containing food such as meat and green vegetables. Impaired absorption of iron from the food during pregnancy seems to be associated with a temporary hypochlorhydria. For example, it has been demonstrated that 75 per cent of normal women do not secrete a normal amount of free hydrochloric acid or pepsin during one half of pregnancy, that 80 per cent secrete high concentrations after delivery, and that the secretion during the puerperium is approximately 3 times as great as the secretion during the last trimester of pregnancy. It has been shown also that women on an adequate diet sustain an average hemoglobin loss during pregnancy of 5 per cent if the gastric acidity is high, of 9 per cent if the gastric acidity is low and of 18 per cent if there is a total achlorhydria.

A daily dose of from 6 to 9 gr. of ferrous sulphate or of from 30 to 50 gr. of iron and ammonium citrate may be regarded as a certain preventive of hypochromic anemia. When the anemia is established, 15 gr. of ferrous sulphate or 90 gr. of iron and ammonium citrate daily will insure satisfactory recovery, whether this treatment is given before or after delivery.

Macrocytic anemias are much more serious but less frequent than the iron deficiency group. As a

rule the red cell count is more markedly reduced than the hemoglobin so that the color index is greater than 1. There is an increase in the average size of the red cells (macrocytosis). Anisocytosis and poikilocytosis are almost constant findings. Often the total white count is low and the differential count shows a relative lymphocytosis. Recent experiments have demonstrated that one or more of 3 deficiencies may play a part in the production of macrocytic anemias: (1) deficiency of an extrinsic or food factor probably allied to Vitamin B and present in large amounts in yeast, meat, and green vegetables, (2) deficiency of an intrinsic factor normally secreted in the gastric juice, or (3) deficiency in the absorption and utilization of the liver factor.

Tropical macrocytic anemia is common in India where the diet of native women is often deficient. It is apparently aggravated by pregnancy and responds rapidly to liver therapy.

True pernicious anemia complicated by pregnancy is rare because anemia of this type usually starts after the menopause. However, in a series of 1,200 cases reported by Cabot, 1 in every 25 had its onset during pregnancy or immediately after delivery.

Pseudo pernicious anemia is apparently a distinct clinical entity. It has all of the hematological features of macrocytic anemia and usually develops during the last few months of pregnancy. It occurs in younger patients more frequently than true pernicious anemia and is common in multiparas. In severe cases, edema and albuminuria appear and the clinical picture may be confused with that of nephritis. The anemia tends to disappear spontaneously after delivery, and when once cured the patient usually remains well without further liver treatment. The condition is thought to be due to a temporary cessation in the formation of the intrinsic factor by the gastric mucosa. In untreated cases the maternal mortality ranges from 30 to 75 per cent and the fetal mortality is even higher. The treatment indicated is the administration of large doses of liver parenterally. If labor is imminent or has already begun the liver therapy must be supplemented by blood transfusions.

**Hemolytic anemia** The essential feature of a hemolytic or erythronoclastic anemia is blood destruction. The clinical picture varies with the severity and rapidity of the hemolysis. The condition usually appears during the last few months of pregnancy. The spleen is often palpable and the liver may be enlarged. During the stage of red cell destruction the urine contains urobilin and urobilinogen. In more severe cases hemoglobinuria may occur. The anemia is marked, but the color index remains at 1. If the bone marrow is unimpaired, polychromasia and nucleated red cells may appear although the degree of anemia remains unaltered. With bone marrow activity (plastic type) a leucocytosis up to 40,000 is not infrequent. The blood picture is therefore essentially different from that of the pseudo pernicious anemia in which macrocytosis is invariably present, the leucocyte count is

normal or low and signs of blood regeneration occur only after delivery or as the result of liver treatment. In hypoplastic or aplastic cases bone marrow activity is slight or absent, and signs of regeneration fail to appear in the circulating blood.

The nature of the toxin responsible for the hemolysis is unknown. Iron and liver are seldom helpful but blood transfusion may be a life saving measure.

GEORGE H. GARDNER, M.D.

**Berutti F.** The Urea Clearance Test During Pregnancy and the Puerperium (La prova della urea clearance nello stato gravidico e puerperale). *Ginecologia* 1936 2 803

Berutti carried out the urea clearance test during pregnancy and the puerperium under normal and pathological conditions in the cases of 111 women. He made 150 determinations. In a large number of the cases the results were normal or nearly normal. In some cases however the percentage values were decreased. They were increased in only a very few.

As a rule the decrease below normal was slight but in a few cases the values were as low as those in clinically well-established cases of renal insufficiency complicated clinical conditions such as infectious icterus and sepsis in which conditions the function of the kidney and liver is impaired. However in the majority of the cases with low percentage values there were no other clinical findings indicative of renal insufficiency. Therefore from both the clinical and the physiological point of view such changes appear to be a characteristic of pregnancy and of certain morbid conditions associated with it.

The most important changes were observed during the latter part of pregnancy especially the period immediately preceding labor and during labor. In the puerperium the percentage values returned to the normal level.

In cases of pregnancy and puerperium complicated by nephritis toxic states or heart disease the urea clearance test showed essentially the same values as those found in the corresponding physiopathological states.

The author believes that in the majority of cases a diminution of renal function corresponding to the lowering of the urea clearance percentage values may be ruled out and that other indefinite pathogenic factors are responsible for the change. Some of these factors rest undoubtedly on a circulatory nervous or endocrine basis. Probably the most important factor is related to the changes of the protein metabolism occurring during pregnancy. It seems that during gestation there is an incomplete breakdown of the proteins into amino acids and other simpler products of nitrogen metabolism which results in a decrease in urea elimination. This factor is apparently one of the most important elements in the mathematical formula of Van Slyke and the only one offering an adequate explanation of the changes noted.

The author concludes that the urea clearance test, which is clinically a very useful index of renal func-

tion, loses considerable value when applied in pregnancy because in this condition the observed changes must be interpreted with caution and in the light of all other clinical and functional criteria of renal function.

RICHARD E. SOMMA, M.D.

**May G. E.** Dehydration Therapy in the Toxemias of Pregnancy. *New England J. Med.* 1936 215 377

According to the newer theories regarding the cause of pre eclampsia and eclampsia, these conditions are possibly of pituitary but more probably of placental origin. In the toxemias of pregnancy blood studies usually show an increase in prolan and a decrease in estrin. The occurrence of spasm of the terminal arteries which seems to explain the pathological findings in the various organs has led to the belief that eclampsia is not a disease primarily of the liver or kidneys but a condition of the small terminal arterioles. Whether the vasospasm is local or central in origin or both is unknown. Also unknown is the answer to the question whether it is a prolan or other endocrine effect.

In addition to vasospasm there is a disturbance of the water balance in toxemias. The latter which results in fluid retention in the body can be accounted for at least in part by spasm of the arterioles especially the glomerular arterioles of the kidney.

Fluid retention alone is probably not responsible for all of the symptoms of toxemia, but it seems to produce or at least to aggravate some of them. Its most obvious manifestations are edema and oliguria. Passive congestion of the kidneys results in albuminuria and may cause the appearance of red and white blood cells in the urine. Increased intracranial pressure from cerebral edema can account for hypertension headache blurring of the vision scotomas coma and convulsions. On the other hand hypertension may be the result of localized vasospasm and the ocular symptoms may be caused by vasospasm of the retinal arterioles.

Forcing fluids on the already "water logged" patients is futile if not harmful. The author compares the results in 65 cases of pregnancy toxemias treated by the Arnold Fay dehydration method with those in a series of cases treated by other methods. Premature induction of labor was necessary in only 13 of the former as compared with 24 of the latter. The blood pressure was decreased in 59 and the albumin content of the urine decreased in 26 of the cases treated by dehydration as compared with 24 and 12 cases in the control group. Maceration of the fetus occurred in 5 of the cases treated by dehydration but in 13 of the control cases. Moreover in the cases treated by dehydration it occurred only in the presence of severe nephritis whereas in 5 of the control cases it occurred in the presence of pre eclampsia or mild nephritis. In the cases treated by dehydration there was none of eclampsia or abruptio placentae whereas in the control group there were 2 of abruptio placentae 1 of antepartum

eclampsia, and 2 of postpartum eclampsia. Also in the control group there was 1 death, that of a woman with severe nephritis.

The author concludes that dehydration has a very definite place in the treatment of pregnancy toxemias.

CHARLES BABCOX, M D

Holmgren, B. *Pregnancy and Labor in Women with Kyphoscoliosis (Gravidaet och Partus bei Kyphoskoliose)*. *Acta obst et gynec Scand*, 1936, 16: 267.

The author first reviews 259 cases of pregnancy in kyphotic or kyphoscoliotic women reported in the literature. While these cases are too heterogeneous for the purpose of determining the indications for, and the type of therapy or to serve as a basis for prognosticating the dangers in pregnancy, labor, and the puerperium, most of them show that kyphoscoliosis may be a serious complication. However, Klifton's series of 85 cases and Lindfors's series of 27 cases both without any maternal mortality, and the author's series of 22 cases with only 1 maternal death demonstrate the favorable influence of early medical supervision.

The author compares his 29 cases of pregnancy in 27 kyphoscoliotic women with 50,014 cases of delivery and abortion at the General Lying In Hospital at Stockholm. In the former the incidence of spontaneous delivery at full term was lower (45 per cent as against 75 per cent), that of premature delivery, higher (14 per cent as against 6 per cent), that of indications for obstetrical operations, higher (31 per cent as against 6 per cent) and the mortality of viable fetuses greater (14 per cent as against 4 per cent). Spontaneous delivery of a living child at full term occurred in 13 cases and spontaneous premature delivery in 4. Forceps extraction was done in 5, cesarean section in 3, and perforation of the dead fetus in 1. Abortion was induced in 2 cases. One woman died during pregnancy of cardiac insufficiency. A study of the tables in the article discloses a number of interesting facts not evident from these figures.

If the 2 cases of early abortion are excluded, there were 6 cases in which spontaneous delivery occurred without complications. The 13 patients with complicated pregnancy presented 1 of 2 important conditions. The first was cardiac decompensation due to a thoracic or thoracolumbar kyphosis, and the second a narrowing of the pelvic outlet which in 4 cases was due to a thoracolumbar kyphosis in 5 to a lumbar kyphosis, and in 2 to a lumbosacral kyphosis. Six patients who were delivered without complications had 10 pregnancies. Six of the pregnancies were terminated by spontaneous delivery at term, 3 by spontaneous premature delivery, and 1 by forceps extraction. There was no maternal or fetal mortality. Thirteen patients with complications had 17 pregnancies. Of these, 7 were terminated by spontaneous delivery at term, 4 by forceps extraction, 3 by cesarean section, 1 by spontaneous premature delivery, and 2 by perforation of

the dead fetus. One mother and 1 fetus died before labor set in. There were 3 other fetal deaths, all due to prematurity or narrowness of the pelvis.

From these results the author concludes that while early artificial abortion in every case of pregnancy in kyphoscoliotic women is uncalled for, such women should be placed under medical control early in order that the heart may be watched (cor kyphoscolioticum). Early persistent symptoms of cardiac decompensation may require interruption of the pregnancy, as may decompensation of the spine from unsatisfactorily healed spondylitis. Patients with signs of vitium cordis late in pregnancy usually require rest and stimulation, the use of a low forceps may be indicated, but cesarean section is rarely necessary. As a rule difficulty due to narrowing of the pelvic outlet may be overcome by the use of low forceps with possibly fracture or excision of the coccyx.

JOHN W. BRENT AL, M D

Blisnjanskaja, A I, and Isaresvitch A I. *Thoracoplasty and Pregnancy (La thoracoplastie et la grossesse)*. *Gynec et obst*, 1936 34: 207.

The effect of pregnancy upon tuberculous women who have been subjected to thoracoplasty has not as yet been definitely determined. The authors cite 12 cases from the literature which seem to indicate that pregnancy is well tolerated by such women. To this series they add 7 cases coming under their own observation.

In all of the authors' 7 cases thoracoplasty had been resorted to only after artificial pneumothorax had been unsuccessful because of pleural adhesions or erudate. In 3 cases phrenicectomy had also failed to check the progress of the disease. In 2, the pulmonary involvement was bilateral. The thoracoplasty checked the tuberculous process in all.

With the exception of 1 patient who became pregnant three months after the thoracoplasty, no harmful effects were noted during pregnancy or the puerperium. In the 1 case in which pregnancy had an unfavorable influence therapeutic abortion was performed and a second pregnancy, which followed almost immediately, had no detrimental effect upon the pulmonary process. The longest period of observation was six years (1 patient) and the shortest, six months. All of the women are now apparently in good health. All of the infants were born alive. Two which were born prematurely died within a few months, one of an intestinal disorder and the other of "congenital weakness." The rest are alive and well.

The authors conclude that pregnancy is well tolerated after thoracoplasty if the disease is controlled by the operation and the woman's living conditions are good. The latter are of great importance. Operative delivery is advisable to spare the patient expulsive efforts during the second stage of labor. When symptoms of incomplete compensation or frank decompensation are present, the pregnancy should be interrupted.

HAROLD C. MICK, M D



Heynemann T. The Liver and Gestation (Feler and Gestation) *Arch. F. G. Gynec.* 1936 161 222

The author discusses the character of the changes in the liver due to pregnancy and the condition of the liver in disease of pregnancy.

#### THE CHARACTER OF LIVER CHANGES DUE TO PREGNANCY

The anatomical changes in the liver in pregnancy are characterized in the weight of the organ (only in animals a functional hyperplasia which does not occur in the human) and in a decrease in the glycogen which is not constant and fatty infiltration of the central lobes of the liver (venous stasis bile stasis). Formerly the latter were thought to indicate in efficiency but today this theory is difficult to reconcile with the view that they are physiological processes.

**Liver function tests.** Tests for galactose, glucose, glycolic tolerance, urea formation from lactic acid, urea synthesis, and quinone fast lipase show few and only slight deviations from the normal. Oral and intravenous tests for levulose tolerance and intravenous tests for galactin, bilirubin, and dye tolerance show elevations more frequently. Beginning hyperglycemia after the administration of insulin and ketogenesis following carbohydrate abstinence and the administration of fats always occur as in liver disease. In agreement with the latter group of changes are an increase of bilirubin and bile acids in the blood and of porphyrin and urobilinogen in the urine, a latent acidosis due to ketonemia, an increase of lactic acid and ammonia, and a decrease of the intermediate products of protein metabolism and urea.

The first 2 groups of liver function tests are distinguished by the fact that they yield quite different and irregular results when repeated even on the same day. The similarity of the carbohydrate metabolism to that of vasoneurotic patients and similar slight variations in the tests during the premenstrual period show the neurohormonal regulation of these processes (increased influence of adrenalin, thyroid hormone, and the 2 hormones of the anterior lobe of the hypophysis).

In the third group of tests, normal sugar formation from lactic acid as well as from glucose and galactose is evidence against a functional disturbance. Changes in the protein metabolism (decrease of urea, increase of ammonia, and nitrogen retention) are explained by inhibition of the oxidative processes. Similarly explained are the changes in the osmotic (hemoconcentration, fat storage). The increase of bilirubin in the serum shows the physiological occurrence of the diazo reaction as icterus. The chief causes are spastic changes in the efferent biliary passages and in the progressive blood changes. Increased excretion in the urine is physiological because increased demands made upon the liver.

**Significance of the changes.** The changes are due to the increased functional demands

changes in the neurohormonal regulators of metabolism. The effort of labor increases the changes (increased labidity, eclampsias). In the presence of these there is danger of gall stone formation because of increased cholesterol excretion in the bile and strong spasms in the biliary passages.

#### THE LIVER IN DISEASES OF PREGNANCY

Unlike the sympathetic nervous system, the liver plays no decisive role in the development of hyperemesis and eclampsia. Even in fatal eclampsia the findings of liver function tests may be good.

**Hyperemesis.** The course and final result of this condition determine the changes in the liver. The liver tests of most practical importance are those for an increase of bilirubin and ketone bodies in the serum and for porphyrin in the urine. On account of the vomiting, functional tests are unreliable. The treatment indicated for hyperemesis is the administration of insulin and glucose. The administration of hormones is of doubtful value (insulin administration is ineffective in eclampsia because of a decreased action). Autopsy discloses diffuse fat infiltration, necroses, and toxic degeneration of the liver.

**Eclampsia.** Changes in the liver are not characteristic of the development of eclampsia. The prognostic value of its prognosis, icterus, and hemolysis make the prognosis worse. The therapeutic administration of liver extract and of glucose is of doubtful value. In spite of occasional poor results of liver function tests, late sequelae are clinically of little importance as regards the development of cirrhosis.

**Hepatitis granulorum.** In this condition the organic findings are the same as in hyperemesis. The easily reversible cases are those of the toxic and the severe cases. On the one hand, the emesis (1) may be the result of the ocular symptoms may be due (2) to the already "water logged" state of the retinal arterioles. The author compares the cases of pregnancy toxemia treated by dehydration method with those cases treated by other methods. Pre-eclampsia of labor was necessary in only 1 case as compared with 24 of the latter. The blood pressure was decreased in 59 and the content of the urine decreased in 26 of the cases treated by dehydration as compared with 24 cases in the control group. Maceration of the fetus occurred in 5 of the cases treated by dehydration, but in 15 of the control cases. Moreover, in the cases treated by dehydration it occurred only in the presence of severe nephritis, whereas in 5 of the control cases it occurred in the presence of pre-eclamptic or mild nephritis. In the cases treated by dehydration there was none of eclampsia or abruptio placentae, whereas in the control group there were 2 of abruptio placentae, 1 of antepartum

nancy and general hepatic disease. As the liver and the extrahepatic bile passages constitute a functional system, he discusses general diseases of both.

The older theories that stone formation is due to interference with diaphragmatic breathing by corsets or tight clothing are now rejected. That gall stones form almost twice as often in women as in men and with even greater frequency in pregnancy and the puerperium, can scarcely be doubted any longer in view of the studies of Schaefer. At any rate an important role in the formation of stones is played by the altered humorochemical endocrine control as well as by the changed reactive state of the sympathetic nervous system in pregnancy. In addition, an inherited disposition, recurrence, or lighting up latent gall stone disease which was present previous to the pregnancy, and changes in the mental and emotional state of the pregnant woman may be factors. The formation of stones as such, is and remains a problem of colloidal chemistry. Therapeutically, somnifen and luminal are recommended for the dyskinesia of the bile passages. The author believes that there may be a relationship between the biliary colic which occurs so frequently in the puerperium and the high cholesterol content of the gall bladder bile at that time.

With regard to the function of the liver in pregnancy, he calls attention to the difficulty in choosing and evaluating the numerous liver function tests in use at the present time. The levulose test is recognized to be the best. Next most satisfactory are the galactose test, determination of the curve of the alimentary blood sugar, and the test of Burger which shows the power of mobilization of the stored glycogen by the appearance of hyperglycemia following the administration of insulin. Of the excretory, premature delivery in 4, a test proposed by the done in 5, cesarean section in 3, and as the best the dead fetus in 1. Abortion was recommended. One woman died during pregnancy of a test, the sufficiency. A study of the tables in the article closes a number of interesting facts not evident. The these figures.

If the 2 cases of early abortion are excluded there were 6 cases in which spontaneous delivery occurred without complications. The 13 patients with complicated pregnancy presented 1 of 2 important conditions. The first was cardiac decompensation due to a thoracic or thoracolumbar kyphosis, and the second, a narrowing of the pelvic outlet which in 4 cases was due to a thoracolumbar kyphosis, in 5 to a lumbar kyphosis, and in 2 to a lumbosacral kyphosis. Six patients who were delivered without complications had 10 pregnancies. Six of the pregnancies were terminated by spontaneous delivery at term, 3 by spontaneous premature delivery, and 1 by forceps extraction. There was no maternal or fetal mortality. Thirteen patients with complications had 17 pregnancies. Of these, 7 were terminated by spontaneous delivery at term, 4 by forceps extraction, 3 by cesarean section, 1 by spontaneous premature delivery, and 1 by perforation of

Schmieden, V. The Liver and Pregnancy. Surgical Aspects. Cholelithiasis and Pregnancy. (Leber und Gestation. Chirurgischer Teil. Gallensteinleiden und Schwangerschaft). *Arch f Gynäk* 1936, 161: 228.

Cholelithiasis occurs from 4 to 5 times as often in women as in men. In 75 per cent of women it has been preceded by pregnancy, often by very many pregnancies, in the course of which the first signs and most of the recurrences developed. Biliary stasis and linking of the cystic duct are favored by pregnancy as well as by constipation and a tendency to vomit. In a gall bladder previously altered by an inflammatory process the latent infection may easily be caused to flare up by the pressure, biliary stasis, and expulsive efforts of labor. The increasing pressure in the uterus may have unfavorable results particularly when the gall bladder contains pus. Cholelithiasis not unfrequently leads to abortion or premature delivery. After the uterus is emptied the changes in the pressure in the abdominal cavity may explain attacks of cholelithiasis. The attack of aseptic stone colic and chronic hydrops of the gall bladder resulting from stone occlusion of the cystic duct are associated with little danger. The most dangerous complications are empyema of the gall bladder, neighboring intrapertoneal abscesses, general biliary peritonitis, and ascending cholangitis with the gradual formation of hepatic abscesses. The last mentioned can be prevented only by early drainage of the common duct. Other dangers are cholemic hemorrhages, gall stone ileus, and pancreatitis.

In the diagnosis it must be borne in mind that the pain of cholelithiasis never begins in the gravid uterus. Pain in the gravid uterus signifies the beginning of labor. In the differential diagnosis catarrhal icterus, appendicitis, pyelitis, ureteral calculus, pancreatitis, duodenal ulcer, adnexitis, and intercostal neuralgia must be ruled out. In the presence of pregnancy, the responsibility of administering morphine is twice as great as in its absence.

Internal and surgical therapy differ fundamentally not only in the fact that internal therapy is used only for mild cases whereas surgery is employed for severe cases, but also in the fact that the internist attacks only the attack, leaving the stone forming gall stones with its contents and all the anatomical changes of the biliary passages and their surroundings untouched, whereas the surgeon attempts complete removal.

Attention on the gall bladder preservation of and without innervation by the proper incision is tolerated. This is more easily possible in early pregnancy. The usual neglect of the gall bladder during pregnancy is the patient and the physician is also responsible for the development of large abdominal masses under pregnancy impossible. In the patient naturally healed scars there is no contraindication of labor during pregnancy and labor of pregnancy because of cholelithiasis under all conditions. In uncomplicated cholelithiasis it would have no effect upon

that condition and therefore would be useless and in cholelithiasis complicated by infection, fever, cholangitis, peritoneal abscesses and other conditions it would be dangerous because of threatening pyemia, embolism and peritonitis. During the first six months of pregnancy any unavoidable laparotomy should be carried out without hesitation, but in the last three months operation should be delayed if possible. Operation is best performed under ether anesthesia. When the indications are absolute that is when the cholelithiasis has serious complications no stage of pregnancy is in itself a contra indication to surgery which is necessary to save life.

In the puerperium an infection of the biliary passages may simulate puerperal sepsis. In pregnancy, protracted icterus should arouse more suspicion of the biliary passages than of toxic hepatocolic angiopathia gravidarum.

On the whole the results of operations for gall stones performed in the presence of pregnancy are no more unfavorable than those of such operations performed in the absence of pregnancy. Even though there is greater inherent danger in the former, the women are usually younger and have greater resistance than non pregnant women who have neglected the condition for a long time.

(H. H. STEIN) LOUIS NEUBERT MD

### LABOR AND ITS COMPLICATIONS

NUMERS C. von A New Method for the Diagnosis of Rupture of the Membranes (Eine neue Methode den Blasensprung zur diagnostizieren) *Zeitschr. Obst. u. Gynäk.* 1936 16 249

The author has attempted to diagnose rupture of the membranes in the course of labor by means of Sudan staining to demonstrate the presence in the vaginal secretion of free drops of fat or expelled cells of the fetal sebaceous glands derived from the vernix caseosa. The technique is as follows:

A milk glass speculum having been introduced 1 or 2 cm. above the vaginal introitus 1 drop of secretion is taken with a platinum loop and spread out carefully on a carefully defatted slide. The preparation is then air dried and, without previous fixation is stained at room temperature with a dye solution made by dissolving from 0.2 to 0.3 gm. of Sudan III in 100 c cm. of hot 70 per cent alcohol. The slide is then washed with water, dried with blotting paper and examined immediately under low magnification.

The fat substances are stained a distinct orange red. Particles of mucus are sometimes stained a pale yellowish red. These as well as small faintly stained drops of fat occurring in expelled cells of the vaginal epithelium may be easily distinguished from the fetal fat substances.

This test was made in 280 cases. In 141 it was made before and in 139 after rupture of the membranes. In 4 of the former the Sudan reaction was slightly positive but in the others (97.2 per cent) it was negative. Of the cases in which the test was made after rupture of the membranes the result was

positive in 99.3 per cent being negative in only 1. Slight Sudan reactions seems to be relatively more frequent in cases of premature rupture. The incidence of faulty reactions in the entire number of cases studied was about 2 per cent.

An abundance of fat substances in the vaginal secretion justifies the presumption that rupture of the membranes has taken place, whereas a negative Sudan reaction indicates that the membranes are still intact.

KANE H. F. and ROTH C. B. The Relief of Labor Pains by the Use of Paraldehyde and Benzyl Alcohol. *J. Am. Med. Ass.* 1936, 107 1210

In practically all cases in which labor is of more than four hours duration the combination of paraldehyde and benzyl alcohol administered rectally produces complete amnesia without unduly prolonging the labor and without causing ill effects on either the mother or the child. It is given as soon as the patient complains of pain without regard to the cervix contractions, parity or the condition of the membranes. The mixture apparently softens the cervix and hastens dilatation. In the cases of primiparas the average time between the first rectal instillation of the mixture and the appearance of the presenting part at the outlet has been seventeen hours and forty-one minutes and in those of multiparas eleven hours and fifty-five minutes. In primiparas the duration of labor ranged from one to thirty hours and in multiparas, from one half to twenty hours.

Laboratory experiments and clinical experience have shown that there are no deleterious effects on the heart, liver, kidneys, lungs, or respiratory center. As paraldehyde is excreted largely through the lungs it is perhaps contra indicated in the presence of pneumonia. However it was used successfully in a case of active pulmonary tuberculosis. No patient has shown evidence of proctitis.

The technique of administration is as follows:

1. The lower bowel is thoroughly cleansed with a soapstuds enema followed by irrigations with physiological sodium chloride solution until the return is absolutely clear.

2. The dose of paraldehyde is 12 c cm. to each 10 lb. (4.5 kgm.) of the woman's weight at the beginning of labor.

3. The dose of the benzyl alcohol is always 15 c cm. The dose is not varied with the weight of the patient as the action of this drug is largely that of a local anesthetic.

4. By means of a funnel and large catheter the mixture is instilled into the rectum by gravity. As the solution disappears it is followed by not more than 30 c cm. of physiological sodium chloride solution.

5. The mixture is given as soon as the patient complains of pain. If necessary, the dose (always the full dose) may be repeated one and one half hours after the first dose. As labor progresses it will be found that the effect of each successive injection

is more lasting, the intervals between repetitions becoming three, four, or five hours

6 If the patient is awake one half hour after the initial instillation,  $\frac{1}{4}$  gr. of morphine is given. If necessary, this may be repeated

7 When several doses of the mixture are given, the rectum is irrigated with physiological sodium chloride solution before each alternate instillation

8 To minimize dehydration, a glass of orange juice or water is given before each injection

9 As the patient is not conscious of bladder distention, catheterization is performed every eight hours

The authors emphasize especially the necessity of repeating the rectal injection when the patient begins to awaken, before she has become restless

In the home, this method should be used only when the physician is prepared to stay with the patient throughout the duration of labor

Of 611 cases reviewed, there was complete relief from the memory of pain in 89.7 per cent, partial relief in 2.6 per cent, and no relief in 7.7 per cent. The incidence of stillbirth and neonatal death in these cases was 3.3 per cent. Three (less than 0.5 per cent) of the infant deaths were due to undetermined causes and may be charged to the method

CHARLES BARON, M.D.

#### PUERPERIUM AND ITS COMPLICATIONS

Gordon O. A., Jr. A Contribution to the Etiology and Treatment of Puerperal Inversion of the Uterus. *Am J Obst & Gynec*, 1936, 32: 399

A large group of obstetricians believe that the principal etiologic factor in puerperal inversion of

the uterus is trauma caused, most frequently, by improper execution of the Crede maneuver or by traction on the cord. Huntington has gone so far as to state that the condition is usually the result of mismanagement by the obstetrician. However, when the large number of women attended in labor by the unskilled, and the extreme rarity of puerperal inversion of the uterus are considered it is necessary to conclude that trauma and unskilled management of the third stage of labor are only occasional etiologic factors

The importance of fundal implantation of the placenta as a cause of puerperal inversion of the uterus has been recognized by many. The rarity of fundal implantation corresponds to the infrequency of the inversion. Of 7 cases of inversion, the site of implantation of the placenta was determined in only 2, but in both of these it was fundal

In the case reported by the author, histologic examination showed that the attachment of the placenta was in the fundus, and that this attachment had a definite destructive action on the myometrium of the fundus which favored inversion. Observations at cesarean section have shown that the placenta remains adherent to the uterus during the first few moments of retraction of the myometrium. The uterine wall is thick everywhere except at the placental site. When the placental attachment is at the exact fundus, inversion of the uterus is favored by the placental weight, the thinning of the myometrium at the placental site, and the destructive effects of the placental traction. Trauma produced by traction from below or by unskillful pressure from above may be a contributing factor

FORWARD I. CORNELL, M.D.

# GENITO-URINARY SURGERY

## ADRENAL, KIDNEY, AND URETER

Cubitt A W The Problem of Anuria A Review of Recent Work on Renal Physiology with Reports of 2 Cases *Brit J Surg* 1936, 23 215

The author discusses the difficulties and method of approach to the problem of reflex anuria and reviews the history of the controversy on the subject. He concludes that the unobstructed kidney may be free from gross diseases and that the vascular cramp theory of reflex anuria fails to account for the swelling and congestion of the unobstructed kidney.

Against the theory that lowering of blood pressure is a cause of anuria it is argued that urine should be secreted as long as the filtration pressure in the glomeruli exceeds the osmotic pressure of the colloids in the blood plasma. The latter is 25 mm of mercury and the glomerular pressure is two thirds the pressure in the renal artery. Therefore the secretion of urine should cease only when the blood pressure falls below 45 mm of mercury.

The author reports 2 cases of anuria which were not of the reflex type. In the first the shadow of the obstructed kidney was very dense probably because of congestion and the other kidney was functionless. In the second the anuria followed nephropathy and was probably due to infection and obstruction. Before the operation both kidneys were functioning. The author suggests spinal anesthesia as a therapeutic procedure worthy of trial if is applicable in reflex anuria whatever the cause since the afferent pathway at least is a nervous one.

In conclusion Cubitt discusses briefly recent studies of the response of the blood supply of the kidneys to humoral and nervous influences and the effect of these changes in the blood supply and of changes in the urine pressure on the secretion of urine.

GILBERT J THOMAS M D

Winsbury White H P The Influence of Infection of the Lower Urinary Tract and Reproductive Organs on the Kidneys with Special Reference to Lithiasis and Hydronephrosis *J Urol* 1936 36 409

There are many puzzling cases with symptoms related to the upper urinary tract in which a thorough investigation fails to disclose any apparent cause in the kidneys. For example renal colic often occurs without evidence of stone. In such cases a careful examination should be made not only of the upper but also of the lower urinary tract and of the genital organs. There is experimental evidence that apparently trivial conditions may have an important effect on the kidneys. Pain in the loins has been relieved following the treatment of chronic infection of the uterine cervix by dilatation and cauterization, and treatment of chronic infection of the

urethra by intermittent dilatation. Slight palpable changes in the epididymis may be of considerable significance. A prostate which feels normal on rectal examination may be found at fault by other methods of examination.

Frequently an attempt to explain symptoms of the upper urinary tract by ascending infection is not supported bacteriologically on ureteral catheterization. On the other hand an infection of the kidney, such as staphylococcal abscess, may be present without being indicated by urinary findings. However it must be borne in mind that a focus of infection below the kidney is often associated with renal symptoms. The author has found common forms of disease of the upper urinary tract associated with a chronic focus of infection in the genitals: urethritis or neck of the bladder. The condition of this type demonstrated most frequently by intravenous urography consists of a mild degree of dilatation of the renal pelvis and the upper ureter and possibly also of the calyces and a tendency toward tortuosity and lengthening of the upper part of the ureter, especially in women. The symptoms include loin pain at attacks of pyelitis and disturbances of micturition suggesting also damage to the parenchyma of the kidney. Contact of the uppermost fold of the lengthened ureter with the dilated renal pelvis may result in chronic inflammation and the formation of adhesions between them with narrowing of the ureteropelvic junction and consequent hydronephrosis. According to the author's experience the association of dilatation of the renal pelvis with chronic infection of the neck of the bladder is a common cause of hydronephrosis. Pyelitis and hydronephrosis are much more common in females than in males.

The formation of calculi is not always due to a dietary fault. Frequently it is associated with residual infection in the urinary tract, as in the prostate. Of 150 cases investigated by the author chronic infection in the genitals and lower urinary tract was found in 87 per cent. In the male one should look for mild rather than gross evidence of disease. Palpation of the epididymis and internal genitals reveals only slight pathological changes or none at all. When this is the case urethroscopy and examination of excretions from the internal genitals are indicated. An unusually small external urinary meatus in adults is often associated with palpable abnormalities in the internal genitals and infection.

In the female evidence of uterine and adnexal inflammation may be obtained by palpation and the use of the vaginal speculum. Chronic urethritis is usually evidenced by swelling and redness of the external urinary meatus. In the absence of such signs, cystoscopy will reveal obstruction or gripping of the cystoscope, tenderness, bleeding or tags of inflammatory tissue. In some cases the findings may

be so insignificant as to have no apparent relation ship to stones in the upper urinary tract. It is even possible that a catheter specimen of urine may be sterile. It is the burden of the investigator to prove that the 2 conditions are unrelated.

The author believes that urinary lithiasis is a manifestation of pre existing urinary tract disease. There is abundant evidence that an apparently insignificant mixed infection about the neck of the bladder prepares the tissues for a vigorous colon bacillus infection which enters the urinary tract by way of the pelvic floor.

There is no evidence that the usual route of infection ascending to the kidney is by way of the lumen of the ureter. Although lymphatic connections have been traced to the kidneys from the genitals by way of the wall of the bladder, this is not the main upward route of lymphatic drainage. The route is obviously along the pathway marked out by the lymph nodes in the pelvis and on the posterior abdominal wall.

To obtain further evidence regarding the routes of infection from the genitals and lower urinary tract to the kidneys, the author injected India ink and living and dead tubercle bacilli into the peri urethral tissues, the base of the bladder, and the uterine cervix of animals. By this means he was able to show that infections in the urinary tract travel upward by way of the lymphatics. In the animals in which the uterine cervix or the urethra were injected with bacilli there were also perivascular collections of inflammatory cells and complete lack of evidence that the upward route of infection is by way of the ureter. The findings were similar when the injections were made into the base of the bladder. Attention is called to the fact that mild dilatation of the ureter and renal pelvis is often shown by urograms made in cases with obvious foci of infection in the lower urinary tract or the genital tract. In the author's experiments the ink particles were traceable also through the lymphatic tissue of the posterior abdominal wall to, and beyond, the kidneys, and undoubtedly much of the ink entered the blood stream.

The author states that the kidneys are often singled out for damage following infections of the reproductive organs and the lower urinary tract long before there is any obstruction to the outflow from the bladder. In his experiments it was only when the bladder wall was directly injected with the India ink that the particles of ink could be traced up the posterior abdominal wall directly to the kidneys. If the wall of the bladder becomes heavily involved by infection, the kidneys are in danger of being subjected to a persistent bombardment by organisms from below.

When the injections of ink were made into the cervix, particles of the ink could not be demonstrated in the kidneys but were clearly demonstrable in the wall of the bladder whereas when the ink was injected into the wall of the bladder it was definitely traceable upward into the kidneys.

Calcification of lymph glands in the lumbar and sacral regions in cases with chronic symptoms referred to the genital organs, lower urinary tract, and kidneys is one of the manifestations of chronicity of the original focus of infection, and the presence of phlebotomy in the pelvis in such cases may be considered strong evidence of a persistent perivascular route of infection. LOUIS NEWELL M D

#### Ormond, J. A. Unsuccessful Plastic Operations for Hydronephrosis. *J. Urol.*, 1936 36 512

The author states that the percentage of failures in plastic operations for hydronephrosis has been high enough to justify reluctance to perform such operations save in exceptional cases. The causes of failure are erroneous or incomplete diagnosis, wrong choice of operative method, faulty technique, insufficient preparation of the patient, the presence or onset of infection, and failure to use certain subsidiary procedures. Of the author's cases, the results were unsuccessful in about one third. Ormond discusses his unsuccessful results in detail, suggesting the possible causes of each.

The conditions suitable for plastic operations are obstructions of the ureter proper or at the uretero pelvic junction. Obstructions of the ureter proper are either strictures or fixed kinks. Obstruction at the ureteropelvic junction may be due to (1) stricture, (2) aberrant vessels, which are often associated with moderate ptosis, and (3) valve or spur formation from enlargement of the lower part of the renal pelvis causing the ureter to leave the pelvis above its lowest point.

For undilatable strictures of the ureter the following procedures have been advocated: (1) incision of the stricture with suture in the reverse direction (Fenger, Heimcke Mikulicz), (2) excision of the stricture followed by end to end suture of the segments of the ureter, with or without the use of an indwelling catheter, (3) excision of the stricture followed by closure of the ends and lateral anastomosis of the segments of the ureter, (4) excision of the stricture followed by invagination of the end of the upper segment into the end of the lower with suture, and (5) excision of the stricture with restoration of the continuity of the ureter by the substitution of a blood vessel, the appendix, or a tube made of peritoneum.

The following subsidiary procedures may also be necessary: (1) nephropexy, (2) nephrostomy, (3) pyelostomy, (4) splinting of the ureter and ureteropelvic junction with a catheter, (5) covering of the suture lines with fat, and (6) drainage of the wound (perineal region).

The author distrusts the Heimcke Mikulicz operation. He states that it is best suited to early uninfected cases, and in such cases reimplantation of the ureter has given good results. Ureteropyeloplasty has no advantage over reimplantation. It is difficult to perform with precision as the kidney and ureter are drawn up out of their natural positions for exposure and the line of incision and repair may

be distorted when they are replaced in their normal positions

Ormond favors resection of the ureteropelvic junction. He cuts the ureter slightly on the bias to lessen the likelihood of stricture due to contraction of the suture line and reimplants it in the lowest portion of the pelvis with accurate apposition of the cut edges so that they do not protrude into the pelvis. With a catheter extending through the cortex and pelvis down the ureter the first suture can nearly always be made with the ureter and renal pelvis *in situ*.

He states that a splinting catheter should be used in every case and not removed too hastily.

In the presence of acute or marked infection preliminary nephrostomy should be done.

Whenever the kidney is not bound down by adhesions preventing mobility nephropexy should be done.

Plastic operations should be reserved for cases in which conservation of renal function is imperative or its desirability outweighs the chance of increased expense, danger, and loss of time.

LOUIS NELWELT, M.D.

Gibson T. E. The Present Status of Renal Sympathectomy. *J. Urol.* 1936 30 334.

Renal sympathectomy has been performed with increasing frequency in recent years on the basis of the theory that otherwise unexplained renal pain is due to disturbed functioning of the autonomic nervous system. The author states that it produces no harmful effects on the kidney. It is feasible either alone or in conjunction with other procedures. In a number of conditions there are either relative or definite indications for its use.

Among the indications are renal sympathetico-tonia (spasm, atony, dyskinesia, hyperdynamic motility, adynamia) either alone or in association with definite organic changes (small hydronephroses, nephropothesis, painful chronic nephritis, painful adhesive perinephritis, essential hematuria, certain types of Bright's disease associated with oliguria or anuria, unyielding reflex anuria, and possibly certain stone-forming diatheses).

Renal sympathectomy in conjunction with other surgical procedures is recommended as a measure to make doubly sure of complete relief in cases of proved renal pain in which careful investigation reveals few or no demonstrable pathological changes to explain the symptoms.

In doing a denervation the author works on the posterior surface of the kidney where the renal artery is surrounded by the nerve fibrils, is more accessible. The nerve fibrils are picked up on a hook and divided great care being taken to avoid injuring the renal vein. At the same time the kidney and upper ureter are freed from adhesions and surrounding tissues.

In 17 cases the author's results in the relief of pain were extremely satisfactory.

HENRY L. SANFORD, M.D.

Darbes V. J., and Dial W. A. Postcaval Ureter. *J. Urol.* 1936, 36 226.

The authors present a report of 2 cases of postcaval ureter and discuss the anatomy, embryonic peculiarities, treatment, and surgical importance of the condition.

Postcaval ureter was first described by Hochstetter in 1893. Since then only 21 cases have been reported in the literature. Apparently, therefore, the condition is rare in man. According to Huntington and McClure it is not extremely uncommon in the rabbit and cat.

In the cases reported by the authors it was discovered at autopsy on adults and in 1 of them it was associated with a right-sided aorta. In both cases the lower portion of the right renal pelvis and the upper portion of the right ureter were dilated and thin-walled. The ureter passed behind the inferior vena cava at the level of the third lumbar intervertebral disk, and at that point was definitely constricted. It then passed forward between the aorta and the vena cava and thence downward, forward and laterally across the anterior aspect of the vena cava. From there to the bladder its course was normal.

From the embryological standpoint the condition is attributed to a fault in the embryonal vascular system, but from the clinical standpoint it may well be classified with the urinary system.

Hydronephrosis has been found in association with postcaval ureter only in adults. Apparently, therefore, the duration of the anomaly is an important factor in its production. It is the result of kinking and stricture incident to the abnormal course of the ureter, pressure of the vena cava, or both. In only 1 of the cases recorded was the diagnosis made before death. In that case it was discovered at operation for stone and the relief of hydronephrosis.

In cases of hydronephrosis of obscure causation the possibility of postcaval ureter should be considered and a lateral as well as anteroposterior pyelogram should be made especially if the latter shows the abdominal portion of the ureter diverted to ward the midline.

For cases in which a postcaval ureter is found at operation the authors suggest transposition of the ureter to a position anterior to the vena cava. Pratt suggests that, as the ureter is thin where it has been wound around the vena cava and as there is a narrowing of its lumen lower down, anastomosis may be followed by difficulty with drainage and dangerous interference with its blood and nerve supply. Therefore nephrectomy may be preferable.

CLAUDE D. HOLMES, M.D.

Maigras P. Extravesical Openings of the Ureter in the Female (Abouchements extravésicaux de l'urètre chez la femme). *J. d'uról. méd. et chir.* 1936 42 269.

Extravesical openings of the ureter in the female are infrequent but have been recognized for a long

time Their clinical detection has become possible with the development of urologic methods of diagnosis The author has observed 5 cases

Anatomicopathologically a ureter with an ectopic opening never has a normal structure It is almost always dilated and infected Histologic examination shows that nearly all of the muscle fibers are replaced by a thick layer of connective tissue

Two types of kidney are usually observed in connection with ectopic ureters One is the "double" kidney, in which the renal parenchyma is continuous and the entire mass is enveloped in one capsule There are 2 renal pelvises, 2 ureters, and 2 distinct pedicles In the other type the renal parenchyma appears to be one but in reality there are 2 distinct kidneys separated from one another by a sheet of connective tissue

In a clinical study the author found that extra vesical ureteral openings in the female usually give rise to an almost pathognomonic type of incontinence which is characterized by being permanent and present from birth

If the ectopic ureteral opening is found, retrograde pyelography will usually disclose the site of the corresponding kidney If the orifice of the ectopic ureter cannot be discovered it is advisable to examine the kidney roentgenologically In the presence of an ectopic ureter, a supernumerary renal pelvis will be found

In the presence of a double kidney heminephrectomy is the procedure of choice if the vascular conditions of the organ permit it If retrograde pyelography fails to reveal this abnormality, the suspected ureter should be incised longitudinally and probed from above downward The point at which the probe appears at the perineum marks the site of the ectopic ureteral orifice

Relatively frequently, ectopic ureters are the site of inflammatory processes which may be easily confused with a pelvic infection of genital origin As laparotomy is contra indicated in these inflammations it is essential to examine the patient very carefully and to look for pathognomonic signs of ectopic ureter, of which the characteristic incontinence is perhaps the most important

RICHARD E SOMMA M D

# BLADDER, URETHRA, AND PENIS

Parker, A F The Lymph Vessels from the Posterior Urethra Their Regional Lymph Nodes and Relationships to the Main Posterior Abdominal Lymph Channels *J Urol*, 1936, 36 538

The author uses the term "posterior urethra" to designate the membranous and prostatic urethra in the male and the postpubic urethra in the female He gives the descriptions of the lymphatic supply of this region which are found in the literature Alling in 1871 demonstrated that the healthy urethra absorbs medicinal and poisonous substances which are not absorbed by the healthy bladder

Parker's studies were made on 48 infant cadavers The injections and dissections are described

Most of the lymph vessels leaving the posterior urethra course backward along arterial branches to lymph nodes located near the main arterial trunks of the pelvis Variations in the distribution of the pelvic arteries determine the courses of the lymph vessels The author presents diagrams showing the more frequent variations

In the male, one set of lymph vessels leaving the anterior surface of the posterior urethra passes laterally upward, following the pubic branches of the obturator arteries Regional nodes are found (1) along proximal portions of obturator arteries, (2) along obturator nerves posterior to the entrance of the nerves into the obturator canal, and (3) along the external iliac veins as they emerge behind the inguinal ligament The latter 2 belong to the internal and middle chains of the external iliac nodes Other lymph vessels from the anterior surface of the posterior urethra pass directly upward in or on the anterior bladder wall They join with lymph vessels from the bladder wall or pass separately to the regional lymph nodes Rarely, they extend posteriorly to the hypogastric nodes Lymph vessels from the posterior urethra inferior to the prostate gland are joined by small lymphatics from the membranous urethra These extend along the pudendal vessels and to the regional nodes and even reach the sciatic nerve They re enter the pelvis

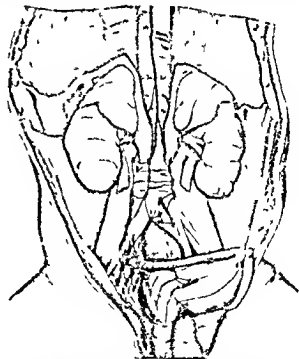


Fig 1 Semi-diagrammatic drawing showing the courses taken by an injection mass through lymph vessels leaving the posterior urethra in the male and passing to the right regional nodes Abdominal channels for the upward extension of the injection mass to the thoracic duct are shown



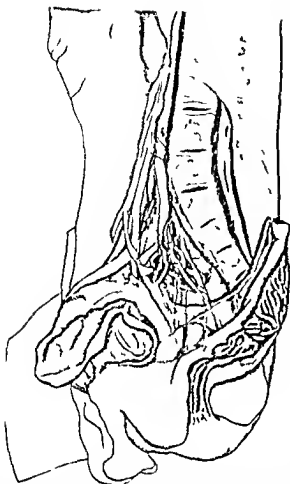


Fig 2 Lateral diagram of an infant male pelvis showing lymph vessels which leave the posterior urethra to follow the vas deferens the inferior vesical artery the artery to the prostate and the middle and superior hemorrhoidal arteries. Intercalated nodules (4 7 9) and regional nodes (1 2 3 5 8) are shown as they are found most frequently

through the greater sciatic foramen and pass thence to the obturator arteries and nerves, the hypogastric nodes and lateral sacral nodes. Other anterior vessels from the superior portion of the prostate follow the lateral walls of the bladder to their regional nodes. From the posterior aspect of the posterior urethra they may be divided into 3 general groups following (1) the superior and middle hemorrhoidal arteries (2) the pelvic portions of the vasa deferentia and (3) the inferior vesical arteries and arteries to the prostate.

In the female the vessels empty into the nodes of the external iliac hypogastric and lateral sacral groups. The lymph vessels from the anterior surface of the posterior urethra are similar to those in the male. The lateral vessels follow the lateral walls of the bladder and reach the obturator or hypo-

gastric groups. The vessels from the posterior aspect follow the uterine artery and reach the external iliac groups. There are no groups following the pubic branches of the obturator arteries as in the male.

The relations of lymph vessels from the posterior urethra and the bladder wall vary in different individuals. Most frequently they anastomose anteriorly to the bladder.

The author discusses the extension of the injection mass from the regional nodes of the urethra. Most of the regional nodes for the posterior urethra belong to the principal groups of nodes of the pelvis.

CILBERT J. THOMAS, M.D.

### GENITAL ORGANS

Kretschmer H. L. Transurethral Resection. *Ann Surg.* 1936 104 917.

With regard to the value of transurethral resection for prostatic obstruction, surgeons may be divided into the following 3 groups: (1) those who have adopted the procedure enthusiastically, (2) those who do not approve of it at all and (3) those who believe that there are definite uses for both transurethral resection and prostatectomy.

Kretschmer has performed transurethral resection in the cases of many patients who had been told by other surgeons that the procedure was impossible. It has been interesting to him to note the large number of doctors who come for this operation in preference to prostatectomy. On one point there is very definite agreement—that in the treatment of cancer transurethral resection is the method of choice combined with radium or deep x-ray therapy.

During the fifty-one months just preceding this report Kretschmer performed only 2 prostatectomies and refused transurethral resection in only 1 case. In the latter that of a patient with a serious cardiac condition suprapubic drainage was established until the cardiac function improved so that transurethral resection could be carried out.

When transurethral resection is performed the period of hospitalization is much shorter than when prostatectomy is done. In the author's cases the average stay in the hospital was seven days except when a preliminary suprapubic cystostomy was required when it was twenty days.

When catheter drainage fails cystostomy is indicated because of chills fever pain or bleeding and also when small stones with severe infection or large stones are present.

Transurethral resection has made it possible to relieve prostatic obstruction in a large number of patients who because of serious coexisting disease in other important organs were very poor surgical risks and had been refused prostatectomy. It has been done without much difficulty also in the cases of many patients with pronounced hypertension.

The importance of a careful study of renal function is obvious. Transurethral resection should never be performed until the renal function is im-

paired, has been restored to normal or at least has become stabilized. There is a group of cases with marked impairment of renal function in which the response to treatment is very slow, the improvement is hardly perceptible, and the functional tests remain fixed at a high level. In such cases transurethral resection is certainly the operative procedure of choice.

The author emphasizes that as a rule transurethral resection requires as much preoperative study and preparation as prostatectomy. However, there are a few cases in which the operation may be done without preliminary catheter drainage.

Preliminary cystoscopy is no longer carried out as a routine procedure. Once the diagnosis of prostatic obstruction has been made, the type of enlargement is determined at the time the resection is performed. The exceptions are cases in which the history is not typical of prostatic obstruction, the patient has had one or more attacks of hematuria, and the cystogram shows a filling defect.

It seems to be the general impression that postoperative complications are fewer, less severe, and of much shorter duration after transurethral resection than after prostatectomy.

In 10.6 per cent of the author's cases it was necessary to resect twice, and in 3.7 per cent, 3 times. However, the possibility that multiple resections

may be necessary is not a contraindication to the procedure.

The occurrence of hemorrhage depends entirely upon how carefully the bleeding points are coagulated at the time of the resection, and as experience is gained this becomes a very minor danger. Secondary hemorrhage occurred after from ten to four teen days in a few of the author's cases, but was never severe. Late hemorrhage is very rare.

Epididymitis is a very uncommon complication. The author no longer does routine vasectomies.

In 804 cases in which transurethral resection was done there was no instance of complete incontinence. Soon after leaving the hospital a small number of patients experience difficulty in holding urine, but this is usually overcome completely very soon.

So far as sexual function is concerned, no decided change has been noted.

The mortality rate has fluctuated from time to time, depending in part upon the type of cases and whether or not transurethral resection is refused to many patients of the so called poor risk type which the author has not done. In 184 transurethral resections performed by Kretschmer there was only 1 death. Recently a large number of patients who were poor risks presented themselves for the operation and the mortality in 804 resections was 3.9 per cent.

FLMFR Hfss, M.D.

# SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS

## CONDITIONS OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC

Dall Aqua V. Levi P. and Bordoli, L. Generalized Osteopathy with Multiple Symmetrical Absorption Stripes—Milkman's Syndrome (Osteopatia generalizzata a molteplici strisce simmetriche di riassorbimento—sindrome de Milkman) *Radiol med* 1936 23 733

The authors report the case of a woman forty three years of age who had suffered for about four years from intermittent pain which began in the legs and later extended to the upper part of the skeleton particularly the clavicles the sternum and the arms, and also to the sacrum. On roentgen examination multiple bone lesions due to absorption were found in both long and flat bones. These lesions appeared as transparent stripes from 3 to 4 mm wide and resembled fractures. They extended transversely across the bones. In some regions the whole thickness of the bone was affected both compact and spongy tissue being involved. The stripes were seen in the epiphyses and metaphyses as well as in the diaphyses. Some bones showed several stripes. As a rule the pseudo-fractures were surrounded by a narrow border of thickened bone. In most of the foci there was no sign of periosteal reaction and in areas in which such a reaction occurred it was very slight. The lesions were in general symmetrical but not exactly in the same sites or developed to the same degree on both sides.

Clinical and roentgen examinations showed no lesions of the viscera. Laboratory examinations revealed an increase in the phosphates of the blood.

The authors regard the condition as a disease entity. They discuss its differential diagnosis from rickets osteomalacia, congenital and late osteogenesis imperfecta and multiple myelomas of bone. They state that only 2 cases have been reported in the literature—one by Milkman in 1930 and the other by Michaelis in 1932.

The disease seems to begin during the second or third decade of life or later. Milkman believes that although its course is very slow it is progressive and fatal. Nothing is known with regard to its cause.

AUDREY GOSS MORCAN M.D.

Wilson J. C. and McKeever F. M. Bone Growth Disturbance Following Hematogenous Acute Osteomyelitis *J Am Med Ass* 1936 107 1188

Wilson and McKeever call attention to the paucity of information relative to bone growth changes resulting from osteomyelitis in children. They then analyze 90 individual foci of bone infection in 64 children under twelve years of age who were under observation for from two to fourteen years. Infections of vertebrae scapulae, ribs, and pelvic bones are not included in their discussion. Growth dis-

turbance was evident clinically in 62.35 per cent of the cases. Of the patients recovering without growth disturbance 18 were operated on after, and 14 before the tenth day of the infection. Therefore early drainage is apparently not a safeguard against growth aberrations.

## PRIMARY VARIATIONS OF GROWTH

**Perimetric hypertrophy.** As gauged by the extent of periosteal elevation, perimetric hypertrophy develops very rapidly during the first three months and then gradually subsides. It is present in all infections of long bones. It occurs to a slight degree in centrally placed Brodie's abscesses, but is absent from areas denuded of periosteum.

**Lengthening.** Of 85 infected long bones lengthening was noted in 21.18 per cent. In the latter the lesions were located in the diaphyses and did not affect the epiphyses. Where a bone was parallel the rate of growth of the uninvolved bone kept pace with that of the diseased bone.

**Shortening.** The incidence of shortening was the same as that of lengthening (21.18 per cent) but in the cases with shortening the infections were all in the region of the epiphyseal disk and changes of premature closure were discernible in the roentgenogram. Paradoxically premature arrest of epiphyseal growth of the greater trochanter of the femur resulted in coxa valga deformity with consequent lengthening. Bowing in the anteroposterior or lateral direction was common and ascribed to muscle pull on bones decalcified by infection.

## SECONDARY VARIATIONS OF GROWTH

Secondary variations following disturbance of joint inclination gave rise to genu valgum and medial or lateral deviation of the ankle. Genu valgum may result from stimulation of growth of the medial half or premature closure of the lateral half of the distal femoral or proximal tibial epiphyses. A similar mechanism accounts for ankle deviations. The os calcis is unique in that small abscesses may occur within it and heal without materially affecting the shape or consistency of the bone. Metatarsal bones and phalanges show great ability to regenerate and regain their normal contour despite extensive destruction sequestration, and perimetric hypertrophy. Destruction of an epiphysis affects only the respective single ray.

A decrease in the size of the foot occurred in 10.2 per cent of the cases although the bony structure of the foot was entirely free from infection. In 2 cases the infection was located remotely, in the upper third of the femur. Since in no instance was there prolonged inactivity or immobilization in a cast for an unusually long period the cause of the disturbance of foot growth is not clear.

JEROME G. FRYER M.D.

Reinoso, A. C. The Value of the Sedimentation Test and Blood Picture in Bone and Joint Tuberculosis (Valor de la sedimentación y del hemograma en la tuberculosis osteoarticular). *Ciruj. ortop. y traumatol.*, 1936, 1, 159

In the period between 1932 and 1935 Reinoso made 12,656 hemograms and sedimentation tests in the cases of 441 patients with bone and joint tuberculosis who were treated at the National Sanatorium at Pedrosa (Santander), Spain. Reports of such examinations in bone tuberculosis are few and have usually been based upon small numbers of observations. So far as the author is aware, the report presented in this article is based upon by far the largest collection of statistics. All phases of the caseous-exudative and granular productive types of the condition were studied by means of routine monthly hemograms (Schilling) and sedimentation tests (Westergreen), and the data correlated with the findings of simultaneous clinical and roentgen examinations.

Reinoso concludes that, aside from the behavior of the lymphocytes and segmented neutrophils, the blood picture has little clinical value in bone and joint tuberculosis. At the beginning of the disease lymphocytosis may be absent or rather marked. Later, it is increasingly accentuated while the neutrophilia decreases, the two percentages being nearly equal toward the end of the process. This relationship persists for some time after clinical cure. With abscess and fistula formation, the segmented forms increase while the lymphocytes decrease to normal or below. The leukocytic formula yields no information of clinical value which is not revealed better by the sedimentation reaction. Therefore, in this form of tuberculosis the sedimentation test is sufficient for routine purposes. The reaction is of great aid for differentiating the granular from the caseous type and predicting softening and milky diffusion. As a rule it is not influenced by the state of coexistent pulmonary lesions. During the active phase of granular bone lesions the sedimentation time is approximately normal (about 10 mm. per hour). During active caseation, before abscess formation, it varies between 30 and 100 mm., even in favorable cases. The sedimentation test is vitally important in differentiating the two types of lesion because at this stage the roentgen signs are usually slight. Acceleration of sedimentation is apparently determined by bone destruction and the exudative character of the process.

During the healing of granular and of caseous foci the average values are 8 and 12 mm. per hour respectively. In all of the reviewed cases with figures above normal an active pulmonary process was present.

When softening of a granular process begins there is a sudden rise of the sedimentation rate to an average of 53 mm. per hour. This precedes clinical signs and is the only warning of the imminent change. Abscess formation in either the granular

or the caseous type is always accompanied by a rise which is directly proportional to the amount of pus. Evacuation of the abscess sometimes causes a fall to the original figure. When a fistula forms the sedimentation time falls to the initial level. However, this occurs only when the fistula formation is not followed by secondary infection. In the investigation reported the figures were highest in cases of fistula in which secondary infection occurred.

Miliary generalization in bone tuberculosis is manifested by a sudden descent in the sedimentation reaction, which may become subnormal. This rapid decline has an even greater diagnostic importance when it occurs in patients who have previously shown high figures and whose general condition is growing worse. It usually coincides with the time when the tuberculin reaction becomes negative.

The report is accompanied by illustrative case reports, tables, graphs, and a bibliography.

M. E. MORSE, M. D.

Meyerding, H. W. The Treatment of Benign Giant-Cell Tumors. *J. Bone & Joint Surg.*, 1936 18 823

Meyerding reviewed the histories, clinical observations, laboratory findings, roentgenograms, and microscopic pictures in 61 cases of giant cell tumor (exclusive of epulis of the jaw) which were operated upon at the Mayo Clinic in the twenty-year period from 1916 to 1936.

Thirty-five of the patients were females. The average age of both males and females was twenty-seven and nine tenths years.

Seven of the 61 patients were treated by irradiation following biopsy at the time of their admission to the Clinic. Three of these 7, who had had no previous treatment, were still alive eleven and a half years, three years, and eight months respectively, or an average of five and eight hundredths years, after the irradiation at the Clinic. Four of the 7, who had received irradiation or treatment by manipulation or with casts before they came to the Clinic, were still living fifteen, seven and a half, five, and two and a half years respectively after the irradiation at the Clinic.

Biopsy was performed in 21.5 per cent of the cases. When this is done by an experienced surgeon little harm results. When the location of the growth is such that it is inadvisable to explore and remove a section of tissue of any size, bits of tissue for microscopic examination can be obtained by aspiration with a needle.

Eleven of the patients whose cases are reviewed were treated by curettage alone or by curettage and cauterization. The 6 in this group, who had had no previous treatment, were living and well after seventeen, fourteen, thirteen and one half, thirteen and one half, eleven, and six years respectively. The remaining 5, who had had some form of treatment before admission, have lived an average of seven and thirty two hundredths years since the curettage at the Clinic. Of the total number treated by curettage alone or curettage with cauterization,

all are living on an average of ten and one tenth years following the treatment and the results appear favorable in 81.8 per cent.

Thirteen (21.3 per cent) of the patients were treated by curettage and irradiation. The 8 in this group who had had no previous treatment were living respectively ten ten eight eight seven six six and six years later an average of seven and six tenths years. Five of the patients had had treatment before coming to the Clinic.

Eleven of the 13 patients treated by curettage and irradiation at the Clinic may be said to have remained well. The incidence of cure was therefore 84.6 per cent. One patient died ten years after treatment of a cause not associated with tumor and 2 have huge tumors of the lower portion of the femur and persisting disability which may necessitate amputation.

Ten (16.4 per cent) of the patients were treated by curettage and bone grafting. Four of this group who had had no previous treatment were living and well fifteen and a half years, eight and three fourths years, four and a half years and three fourths of a year respectively, or an average of seven and three tenths years following the curettage and bone grafting. Six had had treatment before coming to the Clinic.

The results in the group treated by curettage and bone grafting (in 3 cases this treatment was supplemented by some irradiation) were 100 per cent good. The operation requires considerable judgment in the selection of the cases, strict asepsis and orthopedic skill.

Four (6.6 per cent) of the patients were treated at the Clinic by curettage, the use of bone chips or grafts and irradiation. These are living on an average of nine and twelve hundredths years later.

Three (4.9 per cent) of the patients were treated by excision and are living on an average of nine and four tenths years later.

Thirteen (21.3 per cent) were treated by amputation. These are living on an average of ten and four tenths years later. The average postoperative survival of 5 patients who had had treatment before they came to the Clinic has been ten and three tenths years.

The treatment of benign giant cell tumors is determined by the condition of the patient, the site and size of the lesion, the degree of joint damage, the presence or absence of fracture and the perforation or non perforation and penetration of periosteal tissues.

Surgery has demonstrated its ability to cope with the majority of giant cell tumors and when performed by experienced surgeons has been followed by a high incidence of cures. Roentgen therapy has a definite place in the treatment and in the author's opinion will be found of increasing value in the future.

The absence of surgical complications, the length of survival after operation (eight and five tenths years) and the high incidence of satisfactory re-

sults in the 61 cases reviewed indicate that co-operation between the clinician, roentgenologist, pathologist and surgeon makes possible accurate diagnosis and cure of most benign giant cell tumors of bone.

#### Meland O. N. Radiation Therapy of Bone Tumors. *Radiotherapy*, 1936, 27, 410.

Meland calls attention to the fact that although the early use of irradiation in the treatment of bone tumors was empirical, accurate histological diagnosis now enables the radiologist to estimate fairly correctly what may or may not be accomplished by this method of treatment.

Among the benign tumors of bone are listed osteochondromas, giant-cell tumors and bone cysts. Osteochondromas show no response to radiotherapy and are of interest to the irradiation therapist only when they undergo sarcomatous changes. When such changes occur they respond in the same way as the chondrosarcomas. Giant cell tumors are relatively sensitive to irradiation and the author believes that treatment should be moderate in amount and should be given in 2 or 3 series spread over a period of at least a year. Such low doses lead to a slow sclerosis and calcification, whereas high doses given rapidly may be followed by rapid central liquefaction and possibly by pathological fracture of weight bearing bones. Bone cysts show little if any response to irradiation but this treatment may be of value in preventing recurrences after surgery and cauterization.

In the malignant group of bone tumors are chondrosarcomas, endothelial myelomas, multiple myelomas, osteogenic sarcomas, hemangiomas and metastatic tumors. Chondrosarcomas are only moderately sensitive to irradiation but in some cases this treatment may control their rate of growth for a time and may diminish or stop pain. If the tumor continues to grow under massive doses of surface irradiation it may be removed surgically and radium needles may be implanted. The endothelial myeloma is the most radiosensitive of all bone tumors. It may disappear completely after irradiation but in the majority of cases recurrence follows and distant metastasis is the rule. Multiple myeloma is very sensitive to irradiation but so generalized that cure is out of the question. Osteogenic sarcomas as a class are extremely resistant to irradiation. There are 3 varieties—sclerosing osteogenic sarcoma, osteolytic sarcoma and periosteal fibrosarcoma. Of these the periosteal fibrosarcoma responds best. In the author's experience no patient treated for osteogenic sarcoma by irradiation alone survived any great length of time. Hemangio endothelioma of bone varies in radiosensitivity. Usually the younger the patient the more sensitive the tumor. The initial response is encouraging but recurrence and metastasis are the rule. Under treatment by irradiation metastatic tumors of bone may show complete regression and calcification, the relief from pain is striking.

In the treatment of bone tumors the author has used all methods of irradiation therapy. He has found that tumors which are not sensitive to lower voltages have not been influenced to any great extent by supervoltages. He feels that it is too early to evaluate Coutard's protracted method of irradiation. He is of the opinion that with higher voltages insuring greater dosages in the tumor itself multiple ports are less necessary. His usual procedure is to give treatment through 2 or possibly 3 ports, using 200 kv., 4 ma., a distance of 50 cm. and filtration by 0.5 mm. of copper and 1 mm. of aluminum, and giving from 200 to 300 r per port daily. In the treatment of giant cell tumor he gives a total of from 600 to 800 r per port and waits three or four months before repeating the irradiation. In cases of malignant bone tumor he uses a method which is similar except that the filter is increased to 1 mm. of copper so that the dose is increased to from 1,200 to 1600 r per port, and treats the patient daily. In the use of radium he has turned to highly filtered containers, using platinum needles containing 1 or 2 mgm. with a filtration of 0.5 mm.

In conclusion he expresses the opinion that any improvement in the treatment of bone tumors must be along radiological and chemical lines.

His results from the various methods of treatment in cases of various types of tumor are shown by tables.

HAROLD C. OCHSNER, M.D.

Knox, L. C. Synovial Sarcoma. A Report of 3 Cases. *Am. J. Cancer*, 1936, 28, 461.

Malignant tumors having their origin in the specialized connective tissue cells which form the synovial linings as well as those arising from the deeper layers of fibrocytes in the walls of bursas, tendon sheaths, and the articular surfaces of the joints are relatively rare.

The author presents the histories of 3 cases coming to operation. Morphologically the 3 tumors were clearly from the same source although not identical in appearance.

The first occurred in a woman of twenty-two years, grew slowly around the tendons of the right elbow for three years before it necessitated amputation, and was the cause of death seven years later. It was composed of a richly cellular fibrous tissue with a large number of rounded or polygonal cell nests resembling epithelial acini and occasional small pseudo glands.

The second occurred in a man thirty-three years old, involved the tendon sheaths and possibly the bursa in the right popliteal space, grew rather rapidly for six months and at the end of that time had penetrated the soft tissues widely. The leg was amputated, but the tumor had probably metastasized and was undoubtedly the cause of death a year and a half later. In this neoplasm the large cystic spaces and epithelial like cells were even more fully developed than in the first tumor.

The third tumor occurred in a man twenty-six years of age, began in the tendon sheaths on the

plantar surface of the left foot, and grew for two years and a half before amputation was performed. The patient remained well until four years later, when evidence of pulmonary metastases appeared. The structure of the tumor closely resembled that of a tendon sheath, and it is possible that in some portions of the growth the picture was that of an approximately normal structure invaded by the neoplasm. However, the pseudo glandular acini seen in the 2 other neoplasms were not prominent. All 3 tumors were extremely vascular, but consisted essentially of grayish yellow, soft hemorrhagic, cystic, or homogeneous tissue. Grossly, all showed clefts and cystic spaces, some of which were filled with blood while others contained only serum.

Of 22 synovial sarcomas reported in the literature 11 occurred in women. About half of the patients were in the third decade of life. Three were under twenty, 9 between twenty and twenty-nine, and 4 between thirty and thirty-nine years of age. One was in the fourth and 1 in the fifth decade, and 2 were in the seventh decade.

Nine of the tumors occurred in the knee joint and 3 involved the soft tissues lateral or posterior to that joint. Two occurred in the ankle joint, 2 in the tendon sheaths of the right forearm, and 2 in the upper thigh and pelvis.

In 7 (32 per cent) of the cases the duration of symptoms before medical aid was sought was less than a year. In 11 (50 per cent), it ranged from one to seven years.

These tumors do not often arise in joints which have been the site of chronic arthritis. However, it may be assumed that in the 2 cases in which the symptoms had been present for from six to seven years some inflammatory or benign process had been present.

In 10 of the cases the first symptom was pain. In several this was soon followed by the appearance of a tender mass. In a smaller number of cases the first evidence of the tumor was a small growth, and in 12 swelling of a joint with tenderness. Whether the tumor occurs in a joint or in the tendon sheaths, pain may be experienced on both flexion and extension.

Trauma has not been shown to be a predisposing or exciting cause. In fact, most of the records specify that the patient had no knowledge of an injury.

The prognosis is unfavorable. In 10 of the reported cases in which the end result was recorded death resulted or was highly probable at the time of the final report. The interval between the time the patient was first treated and the time of the terminal illness varied from seven months to seven and a half years.

Three patients treated by amputation—2 relatively early—remained in good health for from one to four years. It is unlikely that radiotherapy will prove effective. Synovial tumors behave much the same as fibrosarcomas. Although they are more cellular and show mitoses, they are apparently resistant to radiotherapy.

At operation the appearance of synovial sarcomas occurring in joint cavities is characterized by soft vascular or fleshy villous processes arising from all portions of the lining of the joint. However these processes do not distinguish them from certain inflammatory states. It is more by their soft cellular quality that the tumors are distinguished from the hypertrophic masses occasionally seen in inflammatory states. The latter are more fibrous. When the tumor arises in the soft tissues around the tendon sheaths or near a bursa it may usually be distinguished by the presence of bluish cystic spaces and a slightly gelatinous ground substance which is recognized on section. Between these spaces and clefts the cellular tissue may be gray, yellowish or pinkish. A partial capsule is often found and may be deceiving as to the malignancy of the growth.

In the popliteal space where growths of this type have been most frequent they can usually be distinguished from neurogenic sarcomas by their cystic and vascular structure. Neurogenic tumors grow either as diffuse fibrous masses or show tortuous coils of glistening tissue resembling a nerve trunk. The nodular neoplasms which are orange brown and found in the vicinity of tendon sheaths or within a joint are almost invariably of the giant cell type and relatively benign.

Neither the gross nor the microscopic diagnosis of joint tumors is simple. Certain varieties such as the giant cell tumors of tendon sheaths are recognizable under almost all conditions but the synoviomias can scarcely be distinguished from other sarcomas unless the sections happen to contain some of the special morphological structures in which cysts or pseudo glands or cell nests are found or in the fibrous portion rounded globular cells with intracellular mucoid accumulations and perivascular grouping of these large globular or polygonal cells. Other less cellular tumors will show only the morphological characteristics of a spindle cell sarcoma in which the synovia may not share to any appreciable extent even though the growth is intra articular or intra capsular. So far special stains have failed to disclose the cytoplasmic projections characteristic of the lining cells of the large articulations.

NORMAN C. BULLOCK, M.D.

Kuhns J. G. Low Back Pain. *Rhode Island M. J.* 1936 19: 131.

Pain low in the back is of 2 types: (1) that arising from disturbances in other parts of the body, and (2) that arising in the spine or its supporting structures. The cause of referred pain is usually an infection, a neoplasm or a functional disturbance elsewhere usually in an abdominal or pelvic organ. The cause of local pain is most commonly a strain of ligaments, muscles, or fascia in the lower part of the back or a disease of the lower lumbar spine or the sacrum and their articulations.

Closer study of referred pain low in the back permits subdivision of its causes into general infections, visceral lesions, and neurological disturbances.

The organs which are most frequently factors in pain referred to the lower part of the back are the urinary organs, the lower bowel, and the genital organs. Disease or malposition of the uterus and disease of other portions of the female genital tract may produce such pain. In the male genital tract, disease of the prostate and seminal vesicles are the most frequent causes.

According to the experience of the author and that of several large orthopedic clinics, a relationship between low back pain and so-called foci of infection is rare.

Diseases of the central nervous system which may cause low back pain are tabes, syringomyelia, herpes zoster, meningitis, poliomyelitis, tetanus, and tumors of the lower spinal cord. Infections of the lower spinal column may give rise to low back pain as they advance and encroach upon nerve tissue particularly the posterior nerve roots.

Among other causes of low back pain are tuberculosis, osteomyelitis, peritonitis, and metastatic tumors of the spine.

The most common causes, however, are injuries of the ligaments, muscles, joints, and bones of the lower part of the back. The injury most frequently responsible is strain. In cases of fracture of a vertebra or of the pelvis low back pain may be produced by the fracture itself or by the strain and contusion caused by the injury. Fractures of the transverse processes of the lumbar spine which are relatively common injuries and the somewhat less common fractures of the laminae and spinous processes cause fairly severe local pain. Dislocations of vertebrae or of the pelvic bones with or without fracture cause regional pain and sometimes paralysis.

The differential diagnosis of low back pain is often tedious. The first determination to be made is whether the pain is local or referred. In cases of referred pain, pain alone is present. Muscle spasm, tenderness, and limitation of motion in the lower part of the back are indications of a lesion in that portion of the spine or in the contiguous structures. In some cases the pain may be due to several diseases. Therefore a careful physical examination of the spine and its neurological structures with roentgenograms and laboratory studies should be made.

The treatment must be comprehensive. The patient's fears and worries and his adjustments to difficulties must be considered. As the processes of repair usually take place slowly the treatment must be continued for a sufficiently long period of time.

NORMAN C. BULLOCK, M.D.

## FRACTURES AND DISLOCATIONS

Klein Schmidt O. Pseudarthrosis and Its Treatment (Die Pseudarthrose und ihre Behandlung). *Chirurg* 1936 8: 313.

The phenomena of physiological ossification during the developmental period are not thoroughly explained. It is assumed that there are hormonal influences which at the conclusion of growth cease

or come to rest and serve only to maintain the equilibrium between the processes of building up and breaking down. Through external and internal causes such as trauma, inflammation, and tumor formation, the hormones can become active again."

Fractures exert a growth stimulating effect on the bone forming tissue. The accompanying extravasations of blood must be very great if they are not absorbed. They leave a deposit of fibrin into which the vascular connective tissue penetrates. This connective tissue forms a bridge between the fracture ends, and after five or six days assumes the appearance of osteoid tissue and thus forms the provisional callus. Why chondroid tissue is formed occasionally is not clear. Perhaps it arises in response to mechanical demands at the fracture site. However, the bone itself forms the principal part of the callus. Calcium is deposited in the connective tissue, and then, as in the development of bone of the connective tissue type, the embryonic tissue similar to bone marrow with the osteoblasts enters the calcified connective tissue and forms trabeculae. Similarly, the chondroid tissue becomes calcified and is changed to bone by bone forming embryonic tissue and its osteoblastic activity. At first the bone is often like a network, but later, apparently under the influence of function, it becomes lamellar. According to Lexer and earlier writers on the subject, the embryonic tissue is derived exclusively from the cambium layer of the periosteum and from the marrow. Bier was also of this opinion but ascribed to the marrow a general stimulus which he characterized as a local hormone.

The purpose of the callus formation is the mutual attraction of like tissues. The advance toward this goal may be disturbed by infections. Unlike Lexer, Bier is convinced of the decisive participation of metaplastically formed bone. Many pathologists see the source of new bone formation in osteoplastic embryonic tissue. It is claimed that periosteum and endosteum contain indifferent zones which, under special stimulation, produce differentiated cells and that if these zones are missing or destroyed the muscle tissue forms osteoblasts instead of connective tissue cells (the indirect metaplasia of Borst and Wurm). According to the most recent theories, the mesenchyme from which all supporting substances originate, is able to form osteoblastic tissue.

Lexer claims that the hyperemia following every fracture provides for good nourishment of the bone-forming tissue and the development of a collateral circulation. Jones believes that the hyperemia leads to decalcification at the fracture ends, and that the deposition of calcium at the site of the fracture is due to proliferation of the connective tissue which gradually interferes with the flow of blood. However, the induction of venous stasis and of arterial hyperemia have shown no sure effect. Bier recommends the injection of blood in cases of delayed callus formation. The extravasated blood contains a ferment, phosphatase, which stimulates callus formation through the deposition of calcium.

Immobilizing bandages should be truly immobilizing. The feared functional injury of the simultaneously immobilized joint will not occur if the free joints are moved sufficiently. According to Bier, gross mechanical irritations do not hinder fracture healing. According to Lexer, they promote hyperemia. "Even when sufficient callus is formed, mechanical irritations should be prevented since, in the last stage, they may be responsible for zones of structural change and pseudarthroses."

So far, no internal medium for the promotion of fracture healing has received general recognition. Vitamin rich vegetables and fruits appear the most promising. General acidosis seems to be harmful. Calcium and phosphorus preparations should be used.

Kleinschmidt classifies pseudarthroses into (1) simple pseudarthroses, (2) defect pseudarthroses and (3) interposition pseudarthroses.

The cause of simple pseudarthroses is often unknown. Age, poor general condition, wasting diseases, starvation, metabolic and infectious diseases, avitaminosis, pregnancy, and lactation often cause delay of callus formation, but not pseudarthrosis. All or several of the cited processes which must work together for the healing of a fracture may be disturbed. Sometimes new bone formation fails when a bone is broken twice within a short time. The simultaneous occurrence of several fractures may have the same effect. Moreover, open reduction of a fracture in poor position after an abundant amount of callus has formed may lead to marked delay of healing, i.e., exhaustion of callus formation.

Weak callus formation is to be sharply distinguished from retarded callus formation in the most common sites. In the upper and lower leg the latter are the lower portions of the lower and middle thirds, in the upper arm, the border of the middle and upper thirds, and in the clavicle, the region of the inner third. Rehn sees the reason for this in the absence of strong muscles and their movement, with the consequent lack of a supply of phosphoric acid. Poor vascularization with a correspondingly poor collateral circulation is also to be considered. According to Lexer, the failure of bony union to occur in the presence of apparently sufficient callus formation is due to the formation of non specific scar tissue, which is often the result of very massive blood effusions. In old fractures with originally good callus formation constant movement leads to pseudarthroses. This is true also in bone grafts.

In cases of defect pseudarthroses the fracture is always compound. The necrosis of portions of bone stripped of periosteum, the usual, though often mild, infection, and the spaces between the fragments are causes. Therefore bone fragments should not be removed, and traction should not be overdone.

With regard to pseudarthroses due to the interposition of soft parts it is generally agreed that living tissue leads to pseudarthroses. At operation Lexer frequently found interposed muscle, whereas other surgeons found only dense scar tissue. Ac-



cording to Kleinschmidt interposed tissue should be removed after from eight to ten days but according to Lexer not before the expiration of four weeks.

In Kleinschmidt's opinion immobilization is obtained best by means of the unpadded plaster cast. Compound fractures should be changed into closed fractures by preservation of the soft parts and if necessary by means of flaps. When in a case of fracture of the lower leg in which the fracture ends are otherwise in good position pseudarthrosis threatens because of the interposition of tissue an ambulatory plaster cast may be of value. In a case of such fracture in the arm refracture may be advisable. However if a broad interposition is present and the ends are already atrophied and tapered healing can no longer be expected from conservative measures under any circumstances. If the bone ends are bound together by dense connective tissue the simplest procedure the boring of fleck may be successful. From 10 to 30 borings provide bone dust containing minerals and connections between the 2 marrow cavities. Chipping by Kirschner's method is also suitable for such cases. In old cases removal of the scar tissue and wide opening of the marrow cavities may be desirable. However the latter procedure means shortening. If this is not justified transplantation must be done. The graft may be obtained from the ends of the fractured bone and from the tibia. It should consist of the full thickness of the long bone and possess both periosteum and endosteum. Cicatricial change of the soft parts is dangerous to the transplant. There fore tissue showing such changes should be cut away before the grafting is done. Lexer and Walter state that before the graft is completely replaced by newly formed bone even very slight movements in the plaster cast are sufficient to break it. More over even when scar tissue has been cut out a lateral and axial displacement of the fracture ends may endanger the transplant by new cicatricial contraction and cause fracture or gradual structural changes in the graft. Kleinschmidt believes that it is unnecessary to blame hormonal influences.

(L I N Z) BARBARA B STIMSON M D

Stiméon M A. Fracture of the Epitrochlea in the Adult (*La fracture de l'épitrachée chez l'adulte*). *Rev d'orth p* 1930 45 305

Fractures of the epitrochlea are far less frequent in the adult than in the child. The author reports 5 cases of such fractures in adults reviews 7 cases collected from the literature and presents a detailed discussion of the anatomy of the epitrochlea.

He states that fractures of the epitrochlea may be caused by either direct or indirect violence but usually are due to indirect violence causing hyper abduction of the forearm on the arm. The diagnosis is suggested by the history and signs and symptoms localized to the internal aspect of the elbow. It is confirmed by roentgenograms.

Occasionally the fragment may be pulled into the joint. Dislocations of the elbow are frequently

associated with the fracture and injury to the ulnar nerve may be an early or a late complication of the injury.

The treatment depends upon the extent of the injury. If the entire epitrochlea is displaced it can be easily replaced by open operation and internal fixation. If it is in the joint operation is imperative. If the fragments are small or the displacement is negligible immobilization for a week or so followed by progressive activity will give satisfactory results in the large majority of cases.

BARBARA B STIMSON M D

Olmo V S. Paralysis of the Median Nerve in Fractures of the Elbow. (*Les parálisis del nervio mediano en las fracturas del codo*). *Ciruj ortop traumatol* 1936 1 231

Of 600 cases of fracture of the elbow admitted to the Rizzoli Institute Bologna in the period from 1909 to 1935 the median nerve was involved either alone or with the ulnar or radial nerve or both in 12.5 per cent. Volkmann's contracture occurred in 11 cases.

In the cases of immediate paralysis the injury was due to direct compression of the nerve by the diaphyseal fragment which resulted as a rule in contusion but in some instances in complete severance of the nerve. In the cases of late paralysis the nerve was compressed by callus retraction of the superficial aponeurosis or fibrous tissue in the vicinity of the fracture. When lateral deviation occurred paralysis was immediate. When the deviation was outward the median nerve alone was affected whereas when the deviation was inward the median and ulnar nerves were both involved and Volkmann's contracture developed. All of the cases in which the 3 nerves were affected showed much over riding of the fragments. In V fractures disturbances of the median nerve were caused by a hematoma between the superficial and deep fascia. In comminuted fractures paralysis was due to compression of the nerve by callus and was delayed.

In cases of contusion the prognosis is better than is generally believed although recovery is slow. Patients who left the hospital showing no improvement were found to be completely recovered at the end of two years.

The therapeutic problem is the treatment of the fracture. After perfect reduction the majority of paralyses due to contusion require no special treatment. However electrotherapy is always applicable. Olmo deprecates manual procedures in cases of supracondylar fractures. For these he recommends bone traction by Zeno's method which not only prevents paralysis following reduction but easily releases the nerve from contact with the bone. Operation is necessary when the nerve is severed and when fibrous tissue or callus will hinder regeneration. It is indicated also for reduction of the fracture in old and complicated cases.

Tables diagrams and a bibliography accompany the article.

M F MORF M D

Martin, F. Twenty-Nine Cases of Traumatic Dislocation of the Hip (A propos de vingt neuf cas de luxation traumatique de la hanche) *Icon chir* 1936, 33 559

Martin states that in the last nine years he has had the opportunity to treat 29 cases of traumatic dislocation of the hip at the hospital for natives in Casablanca (French Morocco). The comparative frequency of this accident among the natives has made it possible for him to modify the classic procedure for reduction first described by Despres. His experience has shown that there is a definite advantage in modifying the first stage in this procedure by inward rotation of the hip at an angle of 45 degrees.

As the result of rotation following the first stage of flexion of the hip the greater trochanter is brought near the acetabulum, the iliofemoral ligament being thus relaxed to a much greater extent than in simple flexion, the head of the femur can be more easily dislodged from its luxated position, and the head and neck of the femur are brought parallel with the plane along which they must move in their return to the acetabulum. The neck of the femur is kept at a distance from the obturator foramen, where it has a tendency to become fixed in its descent toward the lower portion of the capsule during the process of reduction.

With the use of this added procedure of rotation the process of reduction becomes easier. The movements should be made gently, the use of force is unnecessary. The patient need not be fastened to the operating table. No assistant is required. The technique of the procedure is as follows:

Spinal anesthesia is used. In the first step one hand of the operator is placed on the knee and the other on the sole of the foot and the limb brought into the position of flexion adduction. In the second step with pressure on the knee to increase the adduction the hip is rotated inward with the upper leg flexed so that it is perpendicular to the axis of the body. In the third and fourth steps the leg is brought down and abducted. The movement of abduction is not begun until the leg is fairly well down as otherwise the head of the femur is liable to be caught under the ramus of the pelvic bone. If this occurs the leg must be raised again in adduction and the rotation increased. ALICE M. MEARS

Magnuson, P. B. Fracture of the Neck of the Femur. Evaluation of the Various Methods Advanced for Treatment. *J. Am. M. Ass.* 1936 107, 1439

The neck of the femur is composed of cancellous bone and fractures through it may result in considerable disintegration of the bone. Because of the impossibility of controlling the proximal fragment in fractures a careful study of the angle of fracture is necessary to obtain satisfactory reduction. Reduction may be accomplished by the Head better or the Whitin method followed by plaster immobilization but the author feels that roentgenograms taken from several angles are essential to

prove that the reduction is satisfactory. In the choice of method it is necessary to consider whether anatomical reposition of the fragments can be accomplished whether the method will maintain the fracture in this position for a sufficient time to allow complete union and whether the patient's physical condition and economic circumstances will allow continuation of the treatment to a favorable conclusion with the least possible disability to joints, muscles and ligaments.

The well leg traction splint has its advocates and is satisfactory in some cases. Open reduction with internal fixation by various methods and blind nailing after closed reduction are gaining widely in popularity. They appear to offer greater comfort to the patient and a greater chance of bony union, to require less nursing, and to be followed by less disability after union so far as the joints of the leg are concerned than any of the closed methods. The author advocates a modification of the Brackett operation with replacement of the hollowed head on the end of the femoral neck with downward transplantation of the greater trochanter. He reports excellent results in fresh cases. He believes that, regardless of the method used for maintaining position close bony contact anatomical apposition and absolute fixation are the 3 prime essentials for better results in fractures of the neck of the femur.

BARBARA B. SIMMONS, M.D.

Padoyani, M. P. Treatment of Malunited Fractures of the Ankle (Traitement des cas vieux du cou de pied) *Re. d'orthop.* 1936 43 441

The author limits his discussion to fractures of the lower portion of the tibia involving the ankle and fractures of the malleoli. He does not include isolated fractures of the astragalus.

The healing of a fracture of the ankle is faulty when it affects the statics of the foot either through deviation of the axis or through derangement of the morrice. The most frequent deformity is outward displacement of the foot which is frequently associated with separation of the tibiofibular joint. Posterior displacement of the foot is often due to an unreduced fracture of the posterior lip of the tibia. Varus deformity is quite rare. Forward displacement due to fracture of the anterior tibial lip is also infrequent. The most common combination of the principal deformities is equinovarus.

The author briefly discusses the physiological results of the deformities which are manifested by varying degrees of chronic arthritis and changes in the character of the bone. He states that in the determination of the type of therapy to be used the clinical examination is of great importance. Pain, the gait, and the movement of the various joints as well as the gross deformity must be carefully analyzed. However roentgenograms are of most aid in the study of the case. The cause of the deformity should be determined if possible. In adequate reduction inadequate maintenance of reduction either because the apparatus allows the

fragments to slip or because it is removed too soon, or irreducibility of the original fracture may be the explanation. The factors essential for the prevention of deformity of the ankle are early adequate reduction checked sufficiently frequently by roentgen examination and adequate immobilization for a long enough period.

When malunion occurs the choice of treatment depends upon the anatomical type of the fracture, the duration of the lesion and the condition of the joint and surrounding soft parts. The aims of surgical treatment are (1) to re-establish the axis of the foot and the leg (2) to minimize or abolish painful symptoms (3) to restore the mortice so far as possible and (4) to preserve a certain amount of movement in the tibiotarsal joint.

The author discusses in considerable detail the various operations devised for correcting the deformities. He divides osteotomies into those performed at the level of the fracture sites and supra-malleolar osteotomies. The first group yield excel-

lent results in relatively early cases and cases in which there is almost an uncomplicated lateral displacement. Supramalleolar osteotomies either linear or cuneiform may be performed when considerable motion persists in the tibiotarsal joint or there is complete ankylosis of that joint. Tibiofibular resection with remodeling of the mortice can be done in cases with gross deformity of the articular surface of the tibia. The author feels that the weight of evidence is against the widespread use of astragalectomy but that this operation may be performed in cases with osteophyte formation in the joint and alteration of the joint cartilages. It is indicated definitely when there is an associated fracture of the astragalus. Arthrodesis of the tibiotarsal joint should be limited to gross articular deformities. The author emphasizes that each method has certain disadvantages and that the choice depends upon the problem presented by the individual case. Illustrative drawings and a bibliography accompany the article.

BARBARA B. STIMSON, M.D.

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Tables, diagrams and a bibliography accompany the article.

M. F. MORSE, M.D.

# SURGERY OF THE BLOOD AND LYMPH SYSTEMS

## BLOOD VESSELS

Veal, J R, and McCord, W M Congenital Abnormal Arteriovenous Anastomoses of the Extremities, with Special Reference to Diagnosis by Arteriography and by the Oxygen-Saturation Test *Arch Surg*, 1936, 33 848

Arteriovenous fistula was first described in the literature in 1757, by Hunter, who reported 2 cases five years later. The congenital variety has always been regarded as infrequent. Of 447 cases of arteriovenous fistula collected by Callander in 1920, only 3 were of this type. However, since the condition has been recognized by surgeons the number of cases reported has been decidedly increased. Within a year preceding this report the authors observed 7 cases.

Congenital abnormal arteriovenous anastomoses occur in both males and females, but are perhaps slightly more frequent in males. They may be recognized at any age, but are most likely to attract attention in early life. Their most common sites are the head and neck, and their next most common sites the extremities. In contrast to traumatic abnormal arteriovenous anastomoses, they are practically always multiple.

The fundamental pathological process is a direct communication between the artery and the vein without intercapillary bed.

Synclinal anesthesia is used because, even though hand of the operator is placed communications be other on the sole of the foot and to produce the into the position of flexion adduction, changes that step, with pressure on the knee to increase tension, the hip is rotated inward with the artery flexed so that it is perpendicular to the axially body. In the third and fourth steps the hip brought down and abducted. The movement of abduction is not begun until the leg is fairly down as otherwise the head of the femur is liable to be caught under the ramus of the pelvic bone. If this occurs the leg must be raised again in adduction and the rotation increased. ALICE M. MYERS

Magnuson P B Fracture of the Neck of the Femur. Evaluation of the Various Methods Advanced for Treatment *J Am M Ass*, 1936 107 1439

The neck of the femur is composed of cancellous bone and fractures through it may result in considerable disintegration of the bone. Because of the impossibility of controlling the proximal fragment in fractures a careful study of the angle of fracture is necessary to obtain satisfactory reduction. Reduction may be accomplished by the Lead better or the Whitman method followed by plaster immobilization but the author feels that roentgenograms taken from several angles are essential to

of great value in cases in which the anastomosis is not sufficiently extensive to change the character of the blood throughout the limb and the diagnosis may be missed because the specimen of blood is taken from an area too remote from the anastomosis to be affected by it.

Arteriography is of great value as it reveals the exact site, type, number, size, and distribution of the abnormal anastomoses. The authors suggest a possible classification of such anastomoses based upon the arteriographic findings in their 7 cases. They state that, by arteriography it is possible to determine which patients should be treated by surgical measures which can be treated safely by the injection of sclerosing solutions when the Perthes test demonstrates adequacy of the deep circulation, and which must be left untreated unless and until amputation proves necessary. The authors' 3 patients who were treated by the injection of a sclerosing solution have remained well to the present time.

HERBERT F. THURSTON, M.D.

Clara, M Arteriovenous Anastomoses (Ueber arteriovenose Anastomosen) *Muenchen med Wchnschr*, 1936, 1 651

Arteriovenous anastomoses or shortcircuits have been recognized for a long time, but interest in them has been renewed by the work of Havlicek on the problem of thrombosis. The author emphasizes that, contrary to the claims of Havlicek and others (Sehr), the anatomical relationships of arteriovenous anastomoses were well known long before Havlicek's studies.

The afferent artery divides into 2 branches, one of which goes over into the capillary net and the other of which forms the anastomosis. The anastomotic portion becomes coiled, sometimes branched, so that in many instances a veritable glomerulus is formed. The wall of the efferent vein is extremely thin as it is almost entirely devoid of smooth muscle cells. The lumen of the vein is very wide. Occasionally the anastomosis runs directly from the artery to the vein.

In place of the usual vascular muscle cells, the sclerotic elements called "epithelioid modified muscle cells" by Schumacher (1907, 1915) are found. According to Clara (1927), the formation of these epithelioid elements is subject to considerable variation in the cells are by no means always present. A functional characteristic of arteriovenous anastomoses is their ability to become completely perfused. It is to be assumed that the lumen is closed by the cell walls of the cells due to their absorption of fluid, and that the cells shrink after giving up water. The functional importance of the anastomoses is definitely that of valves which regulate the pressure adequacy of the capillaries, decreasing that pressure and directing the flow of blood to the heart when they

are open. This would be a sure means of preventing the ever threatening stagnation of the circulation in the peripheral veins. The arterialization of the venous blood which occurs as a result of opening of an anastomosis is also of advantage to the organism. However, it is an incidental result and not the true purpose of the anastomosis.

There are several therapeutic agents which are believed to shut off such anastomoses. Among these are opium derivatives and hypophyseal extract. However, the use of such agents may have undesired associated results such as slowing up of the circulation. According to Havlicek this favors thrombus formation. Havlicek attempts to open the arteriovenous anastomosis by irradiation with ultraviolet rays to prevent stagnation of the circulation. Apparently the sympathectomy recommended by Koenig for the prevention of thrombosis also opens anastomoses.

Erection of the penis is believed to occur as the result of the opening of arteriovenous anastomoses. (W. KLINIC) PHILIP SHAPIRO, M.D.

#### Key E. Embolectomy of the Vessels of the Extremities. *Brit J Surg* 1936 23 350

Key states that one of the most satisfactory operations that can be performed is the removal of an embolus by means of arteriotomy (embolectomy) in suitable cases. He presents a review of the history of this procedure. The first successful removal of a pulmonary embolus was done in 1907 by Trendelenburg, but the patient, a woman seventy years of age, died of hemorrhage. Since Kirschner in 1924 reported a case in which he was able to save life by Trendelenburg's operation similar successful results have been reported by a number of surgeons. Embolectomy is of even greater importance for the removal of emboli producing dangerous circulatory disturbances in the extremities. The author reports 32 embolectomies performed on 30 persons.

The most common source of emboli giving rise to dangerous circulatory disturbances in the extremities is a thrombus in the heart, usually one connected with a decompensated mitral valve lesion. Women seem to have emboli in the extremities of tender than men. The incidence of such emboli is highest between the ages of thirty one and seventy years.

An embolus will lodge most readily where a vessel divides. Of 382 emboli for which operation was performed in Sweden, 54.5 per cent occurred in the common femoral, 17.3 per cent in the iliac, 11.8 per cent in the axillary or brachial, and 11.3 per cent in the popliteal artery, 4.5 per cent at the bifurcation of the aorta, 0.5 per cent in the tibial artery, and 0.3 per cent in the ulnar artery. It is important to bear in mind the fact that not infrequently 2 or more emboli requiring operation may appear at different sites.

Key states that an embolus not removed generally goes through a stage of secondary thrombus formation and that the secondary thrombosis impedes the collateral circulation, thus increasing the danger

of gangrene. The time of the appearance and spread of secondary thrombosis varies considerably. Key has known a secondary thrombosis to appear within two hours after an embolus, whereas in a case reported by Sundberg there was no thrombosis after eleven days.

As a rule the symptoms of embolus set in suddenly and are partly subjective and partly objective. The subjective symptoms are pain, a sensation of cold and disturbances of sensibility. The objective symptoms are a change in the color of the skin, lowering of the skin temperature, disturbances of motility, and absence of skin and tendon reflexes and of pulsation of the involved artery. The frequent suddenness of onset of the pain is highly significant. With the beginning of the pain there is a sensation of cold and numbness in the part affected. The suspension of circulation causes a marked anemia, the temperature falls, and the skin of the affected extremity becomes deadly pale or cyanotic. There is usually no pulse below an embolus. Sometimes the embolus may be palpated in the painful area. This depends upon the site of the embolus and the corpulence of the patient.

The symptoms of an obstructing embolus are so marked that the diagnosis is seldom difficult. Most difficulty in the diagnosis is experienced when the embolus is not entirely obstructive. An embolus must be differentiated from a thrombus due to arteritis, a developing thrombus, and a local traumatic arterial thrombosis. If it is borne in mind that an embolus generally lodges at the division of an artery and is situated more or less central to the boundary of the circulatory disturbance and if the site at which the pulsation of the involved artery ceases is carefully determined the embolus can usually be localized.

With regard to the outlook following embolectomy the author states that a lesion of the intima is likely to develop sooner or later in the area where an embolus is situated and may cause thrombus formation after removal of the embolus and that the relation of the length of time of the obstruction to tissue vitality is of importance. The result depends also upon the patient's general condition, the vitality of the tissues, and the degree of obstruction of collateral channels. In Key's experience the longest time intervening between the appearance of the symptoms and embolectomy without the occurrence of ischemic necrosis or gangrene was twenty-four hours.

Key presents a detailed description of the technique of embolectomy. In all cases he uses local anesthesia induced with novocain and adrenalin. In suturing the vessels he employs Carrel's technique using very fine needles and very fine silk sterilized in vaseline. However, he saturates the compresses with a 2 per cent solution of sodium citrate instead of liquid vaseline. Before the vessel is opened a thin rubber tube is passed around it central to the site at which the opening is to be made. The blood flow is stopped by pulling this tube tightly about

the vessel. Fragments of a fragile embolus may be washed out by allowing a sufficient flow of blood to occur. When an obstructive embolus has lodged so that it is surgically inaccessible, the incision in the artery is made below it in the nearest convenient place and the embolus loosed with a blunt instrument introduced through the arteriotomy so that the blood flow will wash it out through the incision.

The author reviews the results of 48 embolectomies which he performed and 382 performed by other surgeons in Sweden. Of his own cases, the results were good in 39.5 per cent. The results of embolectomy on the axillary and brachial arteries are better than those of embolectomy on arteries of the lower extremities. The prognosis as to the prevention by embolectomy of the development of gangrene due to an embolus depends largely upon how soon the operation is performed after the appearance of the embolus. Of 34 cases in which the operation was performed by the author within ten hours after the onset of the symptoms, normal circulation was restored in 19 (55.8 per cent).

As an embolus often causes a spasm in the part of the wall of the vessel where it lodges, thus disturbing the circulation still further, the use of a spasmolytic substance has been tried. While it is still too early for final judgment, the results of the intravenous injection of eupaverin have been remarkably good. However the author is of the opinion that even if such an intravenous injection can improve the circulation when an embolus is producing grave circulatory disturbances in an extremity the embolus should be removed as otherwise its removal may be imperative later when the prospects of a good result are much less favorable.

HERBERT F. THURSTON, M.D.

## BLOOD, TRANSFUSION

De Bakey, M. and Saldarriaga, A. Some Refinements in the Technique of Blood Transfusion by the Direct Method (Quelques précisions sur la technique de la transfusion de sang pur). *Revue de chir.* Par. 1936, 55, 612.

On the basis of experience gained in over 3,000 blood transfusions given by the direct method in the Charity Hospital, New Orleans, and the surgical clinic of Leriche at Strasbourg, the authors describe a refined technique for such transfusions with the use of an original simplified apparatus.

Their apparatus is ingenious. It consists of a hollow metal cylinder containing a metal piston. In the wall of the cylinder there are 2 openings, one to communicate with the vein of the donor and the other to communicate with the vein of the recipient. The piston has a canal leading from its external end down through its center about half of its length and then out through the side in such a way as to make an accurate connection with either of the 2 openings in the wall of the cylinder depending upon the

position to which the piston is drawn. The outer free end of the piston connects with any standard large syringe used for aspirating. With the syringe adapted to the canal of the piston, the piston is so placed that the inner opening of the canal coincides exactly with the opening in the cylinder leading to the donor. The cylinder is fixed in this position by a simple locking device. A syringe full of blood having been aspirated from the donor, the piston is unlocked, shoved forward until its canal opening coincides with the cylinder opening leading to the recipient, and then relocked, and the blood in the syringe is emptied into the vein of the recipient. Previous to its use the apparatus is prepared by running paraffin oil through it.

Detailed directions are given for the venipuncture, the setting of the 2 cannulas, and the procedure in the event of an unforeseen accident during the transfusion.

JOHN MARTIN, M.D.

## LYMPH GLANDS AND LYMPHATIC VESSELS

Emile Weil, P., Isch-Wall, P., and Perlès, S. The Diagnosis of Hodgkin's Disease by Glandular Puncture (Diagnostic de la maladie de Hodgkin par la ponction ganglionnaire). *Presse méd.* Par., 1936, 44, 1540.

The authors' experience with glandular puncture for the diagnosis of Hodgkin's disease is based on 20 cases, in all of which it was controlled by biopsy. The authors do not claim that they are the first to use this method, as important articles on it have been published by Pavlovski, Pittaluga, Hirschfeld, and Introzzi. They point out that aspiration of a gland with a large needle is associated with less discomfort and expense to the patient than the dissection of a gland from the groin or the axilla, and that in women the scar is important when a gland is removed from the neck. In the cylinder of aspirated tissue removed the typical endothelial and the Sternberg giant cells are identified by means of the May-Grunwald-Giemsa stain.

After puncture of a gland the "adenogram" is studied with regard to the percentage of various cellular elements. When it is evaluated in conjunction with the hemogram, a definite diagnosis may be made.

The authors present protocols and photographs showing the various findings and interpretations of the adenograms.

The chief objection to the method is based on the fact that different portions of a gland may show a different cellular structure. However, when repeated punctures are inconclusive, biopsy can be performed.

The presence of large reticulo-endothelial cells is not sufficient to establish the diagnosis of malignant lymphogranulomatosis. There are rare cases of Hodgkin's disease in which the diagnosis can be made only by splenic puncture.

MARSH W. POOLF, M.D.

# SURGICAL TECHNIQUE

## OPERATIVE SURGERY AND TECHNIQUE, POSTOPERATIVE TREATMENT

Manninger Gajzágo Hauber, and Tóth. The improvement of Asepsis (Die Verschärfung der Aseptik). *Chirurg* 1936 8 133

The sources of error in asepsis to which Manninger called attention thirty five years ago in his publication entitled *The Development of Antiseptics and Asepsis* have not yet been eliminated. In this article the authors discuss (1) sterilization of dead material (2) sterilization of the hands and (3) the air as a carrier of bacteria.

1. *Sterilization of dead material.* The excellent autoclaves of Lautenschläger and Schaefer which free from bacteria anything that can stand heat of 125 degrees are too expensive. Moreover, Lautenschläger recommends special apparatus for bandage material, gloves, instruments, talcum and alcohol. The authors have devised a simple autoclave called *Uno* which is based on the Papin Toper horizontal principle and can be used for the sterilization of all of these materials. In five minutes it can be heated to from 100 to 125 degrees. Complete sterilization requires only ten minutes with additional steam pressure of 1 atmosphere only six or seven minutes. *Uno* possesses a technical advantage:

1. It can be heated with any kind of fuel gas, electricity, petroleum, alcohol, coal, coke or wood.  
2. It can be fitted with a water cooling device by which the sterilized solutions and instruments can be cooled off in a few minutes.

Another advantage is its price which is only one fifth that of the other autoclaves mentioned.

As the heating lasts only a very short time the tensile strength of rubber gloves and silk is not reduced, in fact it becomes greater. The preservation of the tensile strength of rubber gloves is probably due to partial vulcanization. The Hungarian silk vita, which has not been subjected to fat removal loses only about 1 per cent of its tensile strength after repeated sterilizations of five minutes duration. The tensile strength of the best Japanese and English silk increases after heating for five minutes but decreases rapidly when the heating is continued longer. By continuous sterilization for five minutes and immediate rapid cooling in *Uno*, raw catgut can be rendered completely free from bacteria without deterioration provided the sterilization is done in a proper conserving fluid.

The authors point out that the more complicated the apparatus used the easier it is to fail in obtaining asepsis.

For intravenous or subcutaneous injections an irrigator with a narrow bottle neck closed with a cotton stopper in which a needle is inserted is sterilized in *Uno* for five minutes, then cooled to 40 degrees and kept in the autoclave. For sterile solutions re-

quiring great care the liquid is poured into ampoules provided with thick rubber caps and an injection needle is left inserted during the sterilization. A similar ampoule for silk can be used also as a ligature cone.

*Sterilization of the hands.* As was known by Semmelweis the best medium for sterilization of the hands is chlorinated lime. However, the skin cannot tolerate it for any length of time. Therefore Semmelweis used magnesium hypochloride for a while. This however has lost favor as it is only 65 per cent effective. Capote is injurious to the hands. Chinoin a chemically pure calcium hypochlorite preparation does not injure the hands if they are rubbed with an alkaline ointment after the operation. Perfect sterilization is obtained when the hands are not washed with soap before the operation but merely bathed for ten minutes with warm water containing a trace of chlorinated lime which is applied with a rubber brush having pointed teeth. Care must be taken to prevent spilling of the foam on the clothing as it will burn holes. The sterilization lasts for five hours even in rubber gloves. A disadvantage is the smell of the chlorine.

*The air as a carrier of bacteria.* The fact that the air carries bacteria is still too frequently ignored. Spectators in the operating room should be seated behind a glass partition. The authors believe that spectators are responsible for the less satisfactory healing of wounds today as compared with thirty years ago. Of a series of cases in which radical operation for hernia was performed in the period from 1902 to 1905 smooth healing occurred in 99 per cent of those in which rubber gloves were not used and in 99.8 per cent of those in which gloves were worn. Today the incidence of uncomplicated healing is 94.6 per cent. The authors recommend the air conditioning which is used in America but is very expensive. (FRANZ) CLARENCE C. REED, M.D.

Jerábek V. The Treatment of Surgical Tuberculosis by Vaseline Injections and Closed Plaster of Paris Bandages. *J. Bone & Joint Surg.* 1936 18 351

The surgical treatment of tuberculosis of bone has varied from radical extirpation of the disease foci to immobilization in a plaster of Paris bandage with no surgical interference. The author combines plaster immobilization with direct surgical treatment of the pathologic site.

He states that surgical interference is indicated only when the roentgenogram shows a circumscribed cavity. A valuable clinical sign of bone involvement is the presence of a fistula. A fistula is always due to the formation of a sequestrum and its spontaneous discharge through the skin. In the operative procedure followed by the author a wide area of skin about the cavity is first prepared with

ture of iodine. The cavity is then exposed by incision and all necrotic tissue is curetted out. The bleeding is controlled by tamponade with gauze moistened in normal saline solution, and the cavity filled with vaseline.

In discussing the advantages of filling the cavity with vaseline Jerabek says that frequent dressings are unnecessary because the vaseline is forced to the surface as the lesion heals. The vaseline acts as a drain and prevents the cavity from filling with blood which would serve as a culture medium for further bacterial growth. As it is neutral and non-irritating to bone it does not interfere with osteoblastic repair activities.

Para articular lesions are treated by Jerabek in the same way as localized bone foci. After the cavity has been thoroughly curetted and filled with warm vaseline, the skin of the wound area is covered with a coat of vaseline. The wound is closed with a thick layer of gauze to absorb the discharge released by the vaseline, and a plaster of Paris bandage applied to immobilize the joint.

The vaseline coating on the skin prevents maceration. The thick layer of gauze to absorb the drainage matter as it wells to the surface is used because Jerabek doubts the occurrence of cutivaccination in tuberculosis. The plaster bandage is not changed for six weeks. As the wound is undisturbed by daily dressings, secondary pyogenic infection is reduced to the minimum. Jerabek believes that irrigation of the cavity with an antiseptic solution is unnecessary, and that the odor associated with patients treated by this method is not a disturbing factor. He reports 6 cases treated by the described technique.

BENJAMIN G. P. SNATIROFF, M.D.

Meltzer H., and Fillinger, F. End-Results Following Plastic Operations on the Finger Tip (*Diuergergebnisse nach Fingerfüppenplastik*). *Chirurg.*, 1936 8 397

The usual methods of treating recent punch wounds such as occur in workers with wood, iron, steel, and leather have not been satisfactory. These methods include measures to induce healing by granulation and amputation of the bone followed by the application of flaps of soft parts, Thiersch or Krause flaps. The flaps very rarely heal on.

In 1929 Meltzer and Stolze recommended the use of very thick Thiersch flaps including practically the entire layer of the papillae of the cuts, a type of flap intermediate between the Thiersch and Krause flaps. In plastic operations they employed light compression and not open wound treatment. Only 2 of the transplants failed to heal on. The transplantation must be made on the fresh wound and not on granulations. It is remarkable that contamination of the wound was never injurious.

In the period from 1928 to 1934 60 plastic operations were performed on 56 patients. The average duration of the treatment was thirty four days. None of the patients received compensation. All of them were able to work. There were no com-

plaints of a lack of resistance of the transplanted tissues. If these tissues were injured anew, they healed normally. A definite pigmentation of the transplant from brown to a chocolate color was striking. This seemed to develop in the course of the first year. It had already been observed in cases in which Krause flaps were used (Padgett and Garlock).

Of interest are the results with regard to sensation. Feeling was normal in a large number of the cases, but there were marked differences in the types of sensation. The sense of temperature was regained best. In most cases a certain hypersensitivity was evident, but this was never disturbing. Pain from pressure (Collins' dynamometer) was first complained of at 25 kgm. In a few cases the center of the flap was still insensitive, in others, the periphery. The better the underlying fatty cushion had redeveloped, the better the sensibility. Strips of skin have little or no sensibility when laid over bone or aponeurotic tissue. Kredel and Evans claim that in cases of Thiersch transplantation the pain sense returns first, the sense of touch later, and the temperature sense last. The authors are unable to state how much time is required for restoration of the different types of sensation, but state that return of normal temperature sense is more frequent than return of other types of sensation. However, the transplants are dry and desquamative because of the absence of sebaceous glands.

The authors studied also the site from which the flap was taken. There were no important subjective troubles. Frequently the site could no longer be detected, but in some instances it was discernible because of its pallor or fleck-like brown pigmentation. However the sense functions were frequently very much disturbed although often the patient said nothing about it. The sensations of pain and of touch were disturbed most often. This may be explained by the fact that the end organs which determine these sensations lie nearer the surface of the skin than those which determine the sensation of temperature. (FRAZ) JOHN W. BRESNAN, M.D.

## ANTISEPTIC SURGERY, TREATMENT OF WOUNDS AND INFECTIONS

Koch S. L. Injuries of the Hand. *J. Am. Med. Ass.*, 1936, 107 1044

The surgical principles which form the basis of logical treatment of any compound injury are

1. The first law of surgery—to do no harm
  2. Not to leave contaminated tissue in the injured area
  3. To avoid, as far as possible, leaving foreign bodies buried in the tissues
  4. To close every open wound as soon as it can be done with safety
  5. To put injured tissues at rest
- These principles also apply to injuries of the hand. The observance of the first principle—to do no harm—means to avoid every form of injury whether



mechanical thermal or chemical and to avoid adding contamination to that which is already present. The first task in the treatment of the injured part is often the arrest of hemorrhage. This must be done without adding trauma or contamination. First tent oozing is often best controlled by manual pressure with sterile gauze. Spouting vessels if visible are best caught with sterile hemostats which are left in place. Profuse bleeding is best controlled by utilizing a sphygmomanometer cuff inflated to 50 mm. of mercury as a tourniquet.

The next step is to prepare the operative field. With the wound covered by sterile gauze and the described tourniquet in place, a wide area about the wound is shaved and cleansed with soap and water. Preliminary cleansing with benzine or ether is necessary if greasy dirt is present. After the surrounding areas have been thus cared for the wound itself is gently but thoroughly cleared with soap and sterile water or salt solution. No antiseptics of any kind are used in the open wound for those that destroy bacteria also destroy the tissues.

It is the opinion of the author that if the surgeon sees a patient with a contaminated wound shortly after injury and before infection takes place in other words before bacteria have begun to invade and destroy tissue he can usually cleanse the wound and render it surgically clean so that it can be closed and will heal by primary union.

When the preparation of the operative field and the wound is completed the next step is the excision of hopeless injured tissue—debridement. This must be done with care and without needless sacrifice of living tissue. The next step is the repair of injured tissues—reduction of fractures, repair of divided and torn joint capsules, suture of divided tendons and nerves. To avoid as far as possible leaving foreign bodies in the wound it is necessary to abstain from using metal plates or other means of internal fixation in the treatment of fractures and to avoid the use of heavy suture material such as kangaroo tendon, heavy catgut and braided silk utilizing sutures or ligatures and the repair of joint capsules, tendons and nerves the finest and thinnest silk possible.

After the injured tissues have been repaired the next step is the closure of the wound. The author believes that the great majority of wounds which are seen immediately after the injury is sustained can be closed with safety if the pre-operative preparation is adequate and atraumatic. In cases in which there is doubt that the wound is surgically clean the cleansed wound can be packed lightly with gauze impregnated with some non irritating material such as petrolatum and the closure completed if no infection is apparent after twenty four hours. If extensive destruction of overlying skin and subcutaneous tissue is present at the site of injury the principle of primary wound closure still can be applied by the use of various types of skin grafts.

The last principle rarely following the part at rest until healing has taken place requires the use of

various types of immobilizing devices. In the opinion of the author these are as important in the treatment of tendon nerve and soft tissue injuries as in the treatment of fractures.

ARTHUR S. W. TOROFF, M.D.

Cribsch, W. Injuries of the Finger Tips (Über das Verhalten der Finger-Kuppenverletzungen). 1913. Leipsig Dissertation.

The author calls attention to the fact that apparently minor injuries of the finger tips frequently result in disturbances of function. The most important skin change is the appearance of glossiness of the skin which may be accompanied by neuritic symptoms. There is also a reduction of sensation.

The methods of treatment are the conservative, the active operative, the Thiersch transplantation, the Krause flap and the moist and pedicled flap plastic methods.

In the majority of the cases in which the bony phalanx is crushed the object is to obtain healing with a sufficient cushion between the scab and the bone to prevent adhesion of the skin to the bone. Hansen treats such injuries sustained by miners primarily by operation and claims healing with no subsequent disturbances in from 75 to 80 per cent of cases. Cribsch does not consider the incidence of good results satisfactory. Cederkove demands sufficient removal of the bone to permit easy covering of the stump with skin without tension. Pavr and Hoberg have employed conservative treatment more and more frequently. Clearly cut-off finger tips will often heal on their own if treated within five hours. Lamm, Riedner and Lexer believe that under such conditions primary suture is unnecessary. Stolle and Meltzer favor transplantation. Friedrich takes a stand similar to that of Ledderhose. Very few surgeons favor the Thiersch transplantation, pedicled flap and the moist plastic method are suitable for the thumb. Elsewhere their results are uncertain. By the application of a collodion-plaster bandage for from two to three weeks, Loeber has obtained excellent granulation and epithelization with good coloring. The boron- and iodo-tincture treatment of Brunner and the phenol-carbolic treatment of Pavr are good, but the iodine treatment of Sas is not satisfactory.

The author investigated the end results in 120 cases of finger tip injury with loss of substance which were treated at the Leipzig Polyclinic.

1. Twenty cases of clean amputation of the entire tip without injury to the bone. All were treated conservatively. In 15 healing occurred without any disturbances. In 5 a Krause flap did, but healing went on and there was no further trouble.

2. Cases in which the tip or part as much as one-half of the terminal phalanx had been lost. Most of these were treated operatively. Of the 30 patients so treated only 20 per cent remained free from disturbances. The healing usually took from seven to eight weeks. Four patients obtained compensation which is rare in cases of injury of the

fingers Of 4 patients treated conservatively, 3 remained free from symptoms

3 Cases in which the entire phalanx was severed or severely crushed Of 9 patients who were treated operatively, only 2 remained free from symptoms, whereas of 6 who were treated conservatively, 4 were free from symptoms

Therefore, 46 per cent of the patients treated had residual disturbances, an unfavorable result Most of these belonged to the second and third groups which were treated by operation Even the plastic operations yielded poor results The conservative treatment usually consisted of the application of black ointment or vaseline after the introduction, if necessary, of a loose suture to hold the tissues together (FRANZ) LEO A. JURNKE, M.D.

Gurewitsch, G. M., and Rewo, M. W. The Influence of Effusions of Blood on the Evolution of Wound Infection (L'influence des épanchements sanguins sur l'évolution de l'infection des plaies) *Rev de chir. Par.*, 1936 55 555

The theory that hematomas constitute an excellent culture medium for bacteria is widely accepted However, the authors question it on clinical grounds and present experimental evidence in support of their contentions

*In vitro* the bactericidal properties of blood are gradually lost *In vivo*, blood sets up an inflammatory reaction which because of an exudation of plasma, probably resists the proliferation of microorganisms It has been observed also that collections of blood which form in hemorrhagic diseases are notably immune to suppuration

In experiments, which the authors carried out on rabbits they used an operative technique designed to reproduce so far as possible the conditions in a surgical wound An incision from 3 to 4 cm long was made in the abdominal wall sufficiently deep to expose the peritoneum, and after a subcutaneous vein had been allowed to flood the wound the incision was closed In some of the animals the muscles were purposely traumatized Different groups of animals were treated by one of the following methods: immunization with fat free milk or sheep's cells; chilling of the area of the incision with ethyl chloride; and splenectomy or blockage of the reticulo endothelial system Bacteria were then introduced subcutaneously 4-5 cm from the hematoma or intravenously

The results indicate that a hematoma does not in itself constitute an area of diminished resistance, but that the resistance of a wound to infection is lowered by cold and trauma

ALBERT I. DE GROOT, M.D.

Hsieh, C. K., Chang, C. P., and Chung, H. L. X-Ray Treatment of Carbuncle *Chinese M. J.*, 1936 50 1217

X-ray irradiation was employed in the treatment of carbuncle as early as 1906, by Covel Despite the many favorable results reported in the literature,

its use for that lesion is not widely known and has not been generally recognized by surgeons as a satisfactory method

The authors review 39 cases of carbuncle treated by x-ray irradiation, in 25 of which the results are known The lesions were on the lip, cheek, neck, back, and arm Fourteen cases were treated by x-ray irradiation alone In 2 of these, in which the lesion was in the early stage, the suppurative process was aborted In the others, its termination was hastened In most cases the application of hot compresses and carbolicization were supplementary measures In 8 cases, both surgical therapy and irradiation were used with favorable results Three patients did not respond to the x-ray treatment These had a staphylococcus bacteremia before and after the irradiation and died in from two to four days

After describing the technique of the irradiation the authors review the various theories which have been advanced with regard to the mechanism of action of the x-rays on inflammatory lesions and discuss Milani's article on the general and local changes at the site of inflammation following irradiation Immediately after the irradiation there is a leucopenia This is soon followed by a leucocytosis which lasts for from twenty-four to forty-eight hours and then decreases The local action of the x-rays has been ascribed to the rapid disintegration of lymphocytes and the liberation of antibodies by the destruction of leucocytes

The authors present a detailed report of their 25 cases in which the results of x-ray treatment are known HARVEY S. ALLEN, M.D.

Kurttila, E. Tetanus and Its Occurrence in Finland (Über Tetanus und sein Vorkommen in Finnland) *Acta Soc. med. Fennicae Duodecim*, 1936, 22 Fasc. 1, No. 2

On the basis of the cases of tetanus occurring in Finland in the period from 1900 to 1930, the author discusses the geographical distribution of the condition, the effect upon its incidence of geographical factors, its prophylaxis, its symptoms, the results of different methods of treatment, the effect of the length of time elapsing before treatment is begun upon the outcome, the antitoxin content of the blood in later years of persons who have had tetanus, and the antitoxin content of the blood of persons who have not had the condition

Of the total of 428 cases, the detailed case histories of 188 were available for study The condition was most frequent in Uusimaa, Varsinais-Suomi, South Häme, the coastal region of South Pohjanmaa, and elsewhere along the coast The morbidity was greatest in the best agricultural districts, but did not appear to be due to the raising of cattle The most densely populated regions have a clay soil, and the incidence of tetanus was highest in the regions in which the clay contains an abundance of organic substances Deficiency of calcium in the soil does not seem to decrease the frequency of tetanus

In more than half of the cases the condition followed a superficial lesion. Radical operations such as exarticulations and amputations performed relatively early (after from six to eight hours, within twenty-four hours) for other conditions did not seem to prevent the development of tetanus.

The author emphasizes the necessity for prophylactic vaccination after injuries sustained in street accidents as well as after those sustained in agricultural labor and after shotgun injuries.

A short incubation period does not always mean an unfavorable prognosis. The prognosis is poorer the more complete the disease picture. The clinical development is of greater importance than early treatment.

In the reviewed cases the total mortality was 61.0 per cent. In the cases treated with narcotics the mortality was 72.6 per cent. In those treated with serum 56.6 per cent. and in those treated with serum and magnesium 29.6 per cent.

In the serum of 12 normal persons the amount of tetanus anatoxin was as low as that in the blood of 10 persons who had had tetanus except possibly in 1 of the latter.

#### Ramon G. Tetanus Anatoxin in the Prophylaxis of Tetanus in Man and Domestic Animals

(L'anatoxine tétanique et la prophylaxie du tétanos chez l'homme et chez les animaux domestiques)  
*Presse méd. Par.* 1936 44 1635

Ramon states that in 1923 when he prepared his diphtheria anatoxin he prepared also a tetanus anatoxin. The tetanus anatoxin has been found to be stable and safe and to produce active immunity to tetanus in both man and animals.

While it is not yet used as widely as vaccine against diphtheria it is nevertheless now employed in France to a considerable extent and has been tested experimentally in other countries including Canada and the United States. The results obtained with it by various investigators confirm those obtained by Ramon in the last ten years.

It was first used in the immunization of domestic animals. In the case of horses the administration of 2 injections separated by an interval of a month of 10 c cm each of tetanus anatoxin of sufficiently high antigenic value protected the animal against a dose of tetanus toxin that was fatal to unvaccinated controls. The immunity induced by the anatoxin could be increased by the addition of various substances such as tapioca or calcium chloride which caused a local inflammation at the site of injection. It was increased also by a supplementary injection given after an interval of more than a month. By the use of anatoxin for the immunization of horses an antitetanus serum of high titer could be obtained in a short time with relatively small amounts of the antigen.

Since 1928 tetanus anatoxin has been employed for the immunization of cavalry horses in France. About 50,000 horses have been immunized. All of them have been given 2 injections of the anatoxin

mixed with tapioca, and about two-thirds have received the third supplementary injection of 10 c cm of the anatoxin at varying periods after the regular vaccination. A test of the antitoxic titer of the serum of some of these animals several years after vaccination showed from 1/10 to 1 unit of antitoxin per cubic centimeter, whereas it has been demonstrated by Descombey that 1/1,000 unit of antitoxin per cubic centimeter of serum is sufficient to protect the animal against infection. In the period from 1931 to 1934 morbidity and mortality among the horses given 2 injections of anatoxin were much reduced and none of the animals given 3 injections developed tetanus.

For the immunization of human beings 3 injections of the anatoxin the first of 1 c cm and the 2 others of 1½ c cm each are given at intervals of three weeks. If for any reason the series of injections is interrupted, it is better to repeat the entire series. If during the course of the vaccination, the person is injured so that there is danger of tetanus infection an injection of antitetanus serum should be given. The tetanus anatoxin may be combined with diphtheria anatoxin or typhoid paratyphoid vaccine or both. The anatoxin mixture and the anatoxin vaccine mixture are usually given in doses of 2 c cm for 3 injections at intervals of three weeks. For children under seven years of age the first dose of the mixture is reduced one-half when the typhoid paratyphoid vaccine is included. Vaccination should be avoided during an acute disease or any infection of the skin. As the anatoxin contains no serum its use is not contraindicated when a previous injection of serum has been given. No serious reaction to the anatoxin injections has ever been observed. The reactions produced by mixed injections are no more severe than those produced by diphtheria anatoxin or antityphoid vaccine alone. Active immunity sufficient to protect against a virulent tetanus infection is not established until a few days after the second injection of anatoxin. The immunity produced by the completed vaccination has been found to persist for at least several years and if a supplementary injection is given its duration is prolonged.

When a person not previously vaccinated is exposed to tetanus infection the anatoxin should be used in conjunction with the specific serum. The serum is necessary to confer immediate immunity and the anatoxin to prolong the passive immunity by active immunity. The first injection of anatoxin (1 c cm) should be given a few minutes perhaps a quarter of an hour before the serum injection and the serum injection should be made at a different site. Two weeks later a second injection of anatoxin (1½ c cm) should be given and three weeks later a third injection (also 1½ c cm). When a person previously vaccinated is exposed to tetanus infection it is desirable to give a supplementary injection of the anatoxin to increase the immunity. In this way the use of serum and the possibility of a serum reaction can be avoided.

In the cases of persons whose work or manner of life particularly exposes them to the danger of tetanus infection, routine vaccination with tetanus anatoxin is advisable. Such vaccination is especially valuable for children who are exposed to injuries of various sorts in their play. For children, mixed vaccination with tetanus and diphtheria anatoxin is especially desirable. Vaccination against tetanus is indicated also in the army and navy, where it is best combined with typhoid anti-typhoid vaccination. In the French forces this form of vaccination was begun in September, 1936.

In conclusion the author says that as tetanus anatoxin is entirely safe, its use is fully justified to reduce the mortality of tetanus which, in spite of serotherapy, continues to be high.

ALKE M. MEYERS

Woytek, G. Streptothricosis and Its Surgical Importance. Bacteriological, Clinical, and Experimental Investigations (Die Streptothricose und ihre chirurgische Bedeutung. Bakteriologische, klinische, und experimentelle Untersuchungen). *Deutsche Zeitschr. f. Chir.*, 1936, 247, 1.

The author discusses the bacteriology and clinical manifestations of streptothrix infections on the basis of his observations in 15 cases. The unusually large number of his cases indicates that this type of mycosis is not so rare as might be assumed from the paucity of reports on the condition.

In his discussion of the bacteriology Woytek describes the characteristics of the various fungus groups in detail. True branching and the absence of granules or rosette forms necessitate a sharp differentiation between the streptothrix and actinomycetes. The great variability of streptothrix fungi renders their classification difficult. Attention is called to their marked resemblance to the bacilli of tuberculosis and diphtheria. The fact that there are strictly anaerobic streptothrix strains in addition to the aerobic strains is probably one of the reasons why it is often impossible to obtain surface cultures of the organism. According to the author's experience, the strictly anaerobic strains are especially pathogenic to man. The truly pyogenic characteristics of streptothrix fungi, which may at times produce extensive suppurative tissue liquefaction in almost all organs, are particularly emphasized.

The virulence, pathogenicity, and toxin formation of the various fungus species vary widely. Although primary streptothrix infection certainly occurs, it has often been found that the tissues were prepared for the fungus invasion by injury. Tissue death and cicatrization with resulting ischemia in the presence of numerous aerobic bacteria favor the growth of anaerobic fungi.

In man, the lungs and the pleura are common sites of streptothricosis. In contrast to other common similar ray fungus infections, the disease often begins very acutely, with manifestations of severe putrid intoxication. From various bacteriological findings it is to be assumed that the oral cavity,

where the fungi occur as saprophytes, is often the primary focus. Although the initial anatomic lesions suggest tuberculosis because of their nodular form, necrosis and disintegration of tissue soon become the chief manifestations. In some cases the putrid intoxication may dominate the picture from the beginning. There are also fungus infections with an unusually chronic course.

Because of the tendency toward widespread metastasis and the numerous possibilities of complicating late disturbances, the prognosis should be guarded even in cases of peripheral mycotic processes. Most to be feared is direct invasion of the blood stream by the organisms. Rational treatment demands early and radical surgical intervention. Early incision of the lesion is indicated particularly in the presence of threatening general symptoms. The author cites examples from his own cases which show that cure is sometimes possible in very severe infections.

(A. BRUNNER) LEO M. ZIMMERMAN, M.D.

Welch, C. E. Human Bite Infections of the Hand. *New England J. Med.*, 1936, 215, 901.

The author reviews the 18 cases of human bite infections treated at the Massachusetts General Hospital, Boston, during the last eleven years. These cases constituted about 1 per cent of the hand cases admitted during that time.

The clinical course of such infections is remarkably constant. The typical lesion is a small but deep laceration which frequently penetrates the extensor tendon and metacarpophalangeal joint. Welch discusses the immediate and late clinical findings, the location of the injury, the character of the pus, and the tendency of the infection to involve joint and bone.

In the prognosis the type of the infecting organism is of importance. Most commonly the streptococcus viridans and streptococcus aureus are found. When numerous spirochetes and fusiform bacilli are present the prognosis is worse.

Early adequate treatment is extremely important. If the case is seen early and only the skin is involved, cauterization with silver nitrate is the treatment of choice. If the laceration is deep or the patient is not seen immediately after the injury, either excision with the electrocautery or surgical drainage is indicated. Cases of gross infection must be treated by radical incision and drainage.

If the joint is not involved the inflammation is limited to the subcutaneous and subtendinous spaces and as a rule is rapidly relieved. If there is involvement of the joint the finger can be saved only by wide lateral drainage of the capsule and incisions which are left open or packed with hortic gauze.

After the surgical treatment in the reviewed cases the hand was splinted and elevated on a pillow with the dorsum directed downward. Protracted soakings were avoided, but short soaks were given every two hours for two days. Thereafter, frequent irrigations with a 1:1,000 solution of potassium permanganate, hydrogen peroxide, or a saturated solu-

tion of sodium perborate were found satisfactory. In 5 cases arspenamine was given intravenously but seemed of little value.

Complications which are frequent are due to insufficient drainage of the joint cavity. Extension of the infection laterally into the web spaces requires drainage. Bone involvement is difficult to determine but if the diagnosis is certain the finger should be amputated to prevent extension into the palmar spaces. The amputation should be done just proximal to the head of the metacarpal. Evidence of osteomyelitis was found in 7 of the 18 cases discussed.

The author reviews the literature and classifies all cases, including those in his series into 3 groups: (1) cases treated immediately after the injury, (2) those treated after from twelve hours to a week, and (3) those treated later than a week. In 10 cases treated early, poor results were due to treatment which is now considered incorrect. In the 24 cases treated from twelve hours to a week after the injury there were 2 deaths, 7 amputations, and only 7 cures without deformity. Of 13 cases treated late in which the infection was obviously of a less virulent type there were 4 finger amputations and no deaths.

The use of the electrocautery for excision of the laceration is mentioned only with regard to cases treated early. HARVEY S. ALLEN, M.D.

### ANESTHESIA

Lowenberg, L., Waggoner, R., and Zbinden, T.  
*Destruction of the Cerebral Cortex Following Nitrous Oxide Oxygen Anesthesia*. *Ann. Surg.*, 1936, 104, 801.

Nitrous oxide oxygen anesthesia is relatively safe although fatalities following its induction have been reported. Caine was the first to consider brain damage as the possible cause of death, but no histological evidence in support of this theory was presented by those recording deaths. The authors report 3 fatal cases in which destruction of the cortex and basal ganglia was found at postmortem examination. In all of these cases the histological picture was essentially the same. There was severe damage throughout the cortex but especially in the fifth and sixth layers. In 2 cases there were many areas in which the entire cortex was destroyed. The basal ganglia were destroyed or degenerated. The changes in the brain stem and cerebellum were much less severe than those in the cortex and basal ganglia. The histological picture was purely degenerative in type.

Harmful results of nitrous oxide oxygen anesthesia may be divided into 2 groups: (1) deaths and (2) incomplete recoveries. The deaths can be subdivided into (a) immediate deaths and (b) deaths occurring after hours, days or weeks.

In the reported cases of immediate death respiration ceased suddenly and without warning. As a rule the color of the patient was recorded as good.

In the cases of death occurring after varying periods of time respiration ceased suddenly but the failure was not permanent. In none of the cases did the respiration or the circulation return to normal. In all there was marked elevation of the temperature, all reflexes were permanently abolished and convulsions, muscular twitchings, hypermotility of the extremities and trunk were present.

In cases with incomplete recovery there is generalized paralysis with blindness and in some instances loss of speech.

The 2 possible causes of this destruction are (1) asphyxia and (2) a toxic effect of the gas.

The asphyxia might be produced by (1) anoxemia due to a low oxygen content of the blood or (2) anoxemia due to collapse of the brain capillaries. Most writers on the subject have concluded that the anesthetic effect of a nitrous oxide oxygen mixture is not obtained by asphyxiation. The histological picture suggests that the destruction of the brain is due to the toxic action of nitrous oxide on the parenchyma. A definite selective destruction is noted the cortex and the basal ganglia being much more severely damaged than the brain stem and the cerebellum and the clinical picture being that of decortication.

HOWARD A. MCKNIGHT, M.D.

CoTui, Spinal Anesthesia. The Experimental Basis of Some Prevailing Clinical Practices. *Arch. Surg.* 1936, 33, 825.

In order to test various clinical practices in the use of spinal anesthesia the author performed a series of experiments on dogs. He first undertook a study of the effect of the narcotic agent upon the respiratory system it having been stated by previous investigators that concentrations of procaine hydrochloride as high as 2.5 per cent applied to the medulla do not cause respiratory paralysis. He found this to be untrue as he was able to cause respiratory paralysis by injecting the solution into the cisterna magna and by irrigating the fourth ventricle. Spontaneous respiration could be reestablished in a little over an hour if artificial respiration was instituted. It has been claimed that although large experimental doses of a spinal anesthetic may cause death as the result of respiratory paralysis, the usual clinical dose is far too small to produce this effect. However the author points out that the minimal lethal dose, although relatively constant for the unanesthetized normal animal is markedly reduced by the preliminary administration of the commonly employed pre-anesthetic agents such as morphine, sodium amytal and dial. It is reduced also by such factors as old age, dehydration, infections and hypotensive states due to various causes. The author found pyridine betacarbone acid diethyl amide (coramin) to be a valuable respiratory stimulant after the respiratory center has been paralyzed with procaine hydrochloride.

Changes in the blood pressure during spinal anesthesia were next investigated. The typical blood pressure curve was found to consist of (1) a primary

fall, (2) an intermediate rise, and usually (3) a secondary fall. The primary fall occurred before the injection was complete and was accompanied by an increase in the volume of the hind legs and a rise in surface temperature of the footpads. These changes indicated vasodilatation of the limb, and in the author's opinion were due to paralysis of the sympathetic (vasomotor) nerves reached by the fluid injected intraspinal. The extent and duration of the primary fall were found to be dependent more on the volume of the injected fluid than on the dose of the drug. In other words, the larger the bulk of injected fluid, the greater the number of vasomotor nerves paralyzed. The intermediate rise was found to be due to vasoconstriction of the as yet unaffected part of the body in an effort to overcome the primary fall in blood pressure. This was evidenced by a decrease in the volume of the anterior extremities which reached its maximum with the peak of the intermediate rise. The initial intraspinal injection of large volumes of anesthetic fluid paralyzed the vasoconstrictors of the anterior extremities at once and under such circumstances no intermediate rise in blood pressure occurred. It was found also that the efficiency of the compensatory mechanism was impaired in different degrees by various commonly administered pre-anesthetic narcotics. The secondary fall began from five to twenty five minutes after the injection and lasted longer than the 2 previous phases. It is ascribed to the gradual upward spread of the drug with successive paralysis of the vasomotor nerves one by one. The larger the dose the greater the fall in pressure and the longer its duration. The fall was deepened and prolonged by the Trendelenburg position which hastened the cephalad spread of the solution. If the latter reached too high a level, respiratory paralysis occurred with a swift fall in the blood pressure.

In addition to peripheral vasodilatation, splanchnic vasodilatation occurs under the influence of spinal anesthesia. A reliable index of this phenomenon is offered by an increase in the size of the spleen to from 4 to 5 times the normal size. The author states that the fall in blood pressure in spinal anesthesia is due primarily to the paralysis of the vasomotor nerves of the segments anesthetized with consequent dilatation of vessels, both somatic and visceral. Although other factors may be contributory, they are of comparatively little importance.

In addition to the obvious effects of lowered blood pressure during spinal anesthesia, the author found a true tissue asphyxia to be present. This was apparently the result of the sluggishness of the circulation during the hypotensive state. The anoxia is reflected also in an altered tissue metabolism causing an accumulation of lactic acid in the blood (acidosis). Others have previously called attention to the reduced cardiac output during spinal anesthesia, and the diminished ability to endure hemorrhage.

Finally, an effort was made to determine experimentally the comparative efficacy of the usual measures for combating shock due to spinal anesthesia

namely, the intravenous injection of salt solution, the transfusion of blood, the injection of ephedrine, and the Trendelenburg position. It was found that the intravenous introduction of saline solution or blood caused a transient rise in the blood pressure which lasted only as long as the infusion was continued. Ephedrine proved to be effective as it acts on the myoneural junctions of the sympathetic nerves distal to the point of the paralyzing effect of the spinal anesthesia. The Trendelenburg position was found to be not only useless but distinctly dangerous because of the more rapid cephalad spread of the anesthetic solution. Carbon dioxide, although a vasoconstrictor when administered by inhalation to patients with an intact sympathetic nervous system, acts as a vasodilator when the sympathetic nerves are paralyzed during spinal anesthesia. For this reason its administration causes a further lowering of the blood pressure and its use is contra indicated. ARTHUR S. W. Touroff M.D.

Schuberth, O. O. On the Disturbance of the Circulation in Spinal Anesthesia. An Experimental Study (Ueber die Störung des Kreislaufs bei Rückenmarksanästhesie. Eine experimentelle Studie) 1936 Stockholm, Norstedt.

During spinal anesthesia there are at times manifestations of a shock like condition which are considered by some to be incidental symptoms but by others as evidence of a serious complication. These manifestations are a lowering of the blood pressure, slowing of the pulse, pallor, a cold sweat, and vomiting. Because of the similarity of the condition to traumatic shock, the author discusses its causes on the basis of the theories advanced in the literature. He agrees with Rehn that the conception of shock is very inclusive, and that the condition is similar to the collapse, resulting from insufficiency of the peripheral circulation.

The fall in the blood pressure under spinal anesthesia has been ascribed to

1. A toxic action due to rapid absorption of the anesthetic agent in the blood. Against this cause is the fact that intravenous injections of the same anesthetic are relatively innocuous.

2. Special sensitiveness of the centers of the medulla oblongata to the anesthetic.

3. Segmentary paralysis of the vasoconstrictor fibers in the anterior roots.

4. Paralysis of the adrenal nerves with a consequent decrease in the secretion of adrenalin.

5. Secondary circulatory disturbances from depression of the respiration due to partial paralysis of the respiratory musculature.

The third and fifth theories are considered the most plausible. They are based upon experimental studies. The investigations cover the influence of spinal anesthesia upon specific circulatory factors. Under spinal anesthesia the oxygen consumption of rabbits was definitely reduced. A similar, though somewhat less marked reduction was noted also in human beings. The reduction may be due to de

pression of the functions of the body as a whole, as in traumatic shock, or to the relaxation and loss of tone of the paralyzed parts. In favor of the second hypothesis is the fact that a decrease of the blood pressure does not always occur with a decrease in oxygen consumption.

Under spinal anesthesia the difference in the oxygen content of the arterial and venous blood is less than under normal conditions both in rabbits and in man. The reason for this may be a decrease in the hemoglobin content of the blood or a decrease in the oxygen saturation of the blood in the lungs. More recent experiments have shown in spinal anesthesia the arterial blood is "diluted" and therefore contains less oxygen. The decrease in the oxygen content of the venous blood is explained partly by this fact and partly by the decrease in the metabolism of the tissues.

In cases with a decrease in the blood pressure the minute and beat volume of the heart is reduced as in traumatic shock.

When the respiration is not affected the venous blood pressure is lowered only slightly, if at all.

Investigations on rabbits and cats with regard to the circulating blood volume revealed no reduction in the circulating plasma volume and only an indefinite and insignificant reduction in circulating cellular elements. In shock following trauma and in hemorrhage the circulating blood volume is less than normal. This constitutes a basic difference between the shock due to spinal anesthesia and that due to trauma. In the latter there is an exudation of plasma into the tissues which does not occur in the former.

The capillary picture is also different in the 2 types of shock. While in traumatic shock, and particularly in peritonitic shock, there is an increase of blood in the capillaries, in spinal anesthesia such an increase is not observed.

The respiratory volume and the concentration of oxygen in the blood are not affected, even in very high spinal anesthesia so long as the medulla oblongata is not involved. The paralysis of the intercostal muscles is compensated by increased activity of the diaphragm. The fall in the blood pressure is not related to the state of respiration.

In conclusion the author points out that the essential feature of shock in spinal anesthesia is the lowering of the blood pressure which is brought about by peripheral circulatory disturbance and not by cardiac insufficiency. According to the most convincing theory this is due to paralysis of the vasoconstrictors. As at the beginning of the anesthesia the decrease in the blood pressure is compensated by contraction of the non-paralyzed vascular centers it becomes more marked subsequently. Further investigations are necessary to answer related questions.

The facts now known indicate that when lowering of the blood pressure occurs in spinal anesthesia cardiac drugs are useless. Only vasoconstricting peripherally acting substances such as adrenalin, ephedrin and sympatol are effective. Also to be recommended are infusions of Ringer's solution, the Trendelenburg position which facilitates the emptying of the blood from the veins, and inhalations of a 5 per cent mixture of carbon dioxide and oxygen.

(WESTMAN) LEO M. ZIMMERMAN, M.D.

# PHYSICOCHEMICAL METHODS IN SURGERY

## ROENTGENOLOGY

Kopylov, M. B. Roentgen Signs In Hydrocephalus and Their Diagnostic Value. *Am J Roentgenol*, 1936, 36 659

In hydrocephalus roentgen examination of the skull with and without contrast methods reveals a number of changes both in the bones of the skull and in the cavities of the brain. These changes are manifold and not identical in all cases. They may involve the sella turcica or may consist of variations in the configuration of the bones of the vault of the skull with or without changes in the relief of the internal plate. The author's object in this article is to explain the variety of roentgen signs, to point out the regularity of the causes producing them, to establish the connection between them qualitatively and, if possible according to the time of their appearance and to draw practical conclusions therefrom for determining the forms of hydrocephalus. Physiological factors and peculiarities due to age and the variations in the form of the skull and its parts are given consideration and attention is directed especially to hydrodynamics which play a decisive role in the origin of a number of signs revealed by the roentgen examination.

The configuration of the skull is determined largely by hydrodynamic influences which proceed from the ventricles and cause the skull to approach the ideal geometrical figure, i.e. the sphere. Marked changes in the configuration of the skull and its base are shown by the roentgenogram only in cases of hydrocephalus in children. They are more pronounced the earlier hydrocephalus began and are especially pronounced in congenital cases. Similar changes may be observed in the cranial fossae. The skull increases in size its bones become thinner, and the sutures become distended with more or less stretching of the dentations. The openings and passages in the base of the skull are increased. In cases of hydrocephalus in which fluid prevents direct pressure of the convolutions of the brain against the inner tables of the skull the inner relief shows no changes or may be smoother than normal. If the fluid is decreased, digital impressions occur. If the cortical layer of the brain is thinned by excessive or rapidly developing increased intracranial pressure, convolutional atrophy may not be present. Indirectly, increased intracranial pressure may result also in changed circulatory conditions with associated variations in the blood vessel grooves and greater complexity of the relief appearance.

The anatomical and physiological theories relating to the production, displacement, and resorption of cerebrospinal fluid under normal and pathological conditions are discussed at length. Obstructions in certain parts of the ventricular system determine the forms of hydrocephalus. Open and closed types

are recognized, the former with (1) prevalence of hypersecretion, and (2) the presence of non resorptive phenomena. Each type is discussed in relation to its characteristic roentgen signs.

In the open form of hydrocephalus in children the sella is usually unaltered. Encephalography reveals dilatation of the ventricles and a large quantity of air in the subarachnoid spaces. In the non resorptive open form with adhesive phenomena in the subarachnoid space, the air is distributed sparsely or unevenly.

In the closed form of hydrocephalus, the sella turcica undergoes great changes which vary sufficiently in connection with different points of occlusion to suggest the location of the occlusion. When the occlusion occurs at the level of the aqueduct of Sylvius, the dorsum sellae and posterior clinoid processes tend to be deviated posteriorly by the pressure and show more obvious atrophy of their anterior aspects. The sella is deepened and its floor is even, smooth, and round. Occlusion below the aqueduct of Sylvius is apt to cause the dorsum sellae to lean forward and become atrophied or to undergo infraction by pressure from behind. The entrance to the sella narrows, and there is some increase in depth posteriorly. The mechanics of these changes are described in detail. The author offers explanations also for cases in which lesions at some distance from the site of occlusion lead to changes of a similar nature. Difficulties in differential diagnosis in connection with destructive effects involving the sella from other causes are discussed. Ventriculography may be of great value in these cases.

In hydrocephalus, roentgenography may furnish not only evidence of the presence of the condition but also information which cannot be obtained from the clinical history or by other methods before operation or autopsy. The principal roentgenographic signs of both the open and the closed forms of hydrocephalus as regards the sella turcica, digital impressions, vessel furrows, diploic veins, sutures, configuration of the skull and fossae, and thickness of the bones are tabulated. ADOLPH HARTUNG, M.D.

Skarby, H. G. The Foramen of the Clavicular Nerve in the Roentgenogram (Das Foramen Nervi claviculans im Roentgenbild). *Acta radiol* 1936, 17 397

In the course of the examination of a patient who had suffered an injury of the left shoulder region a small, oval, perforating opening was observed just lateral to the center of the clavicle on the right side. Although such an opening (canal) is relatively frequent and has often been mentioned in the anatomic literature, it has not been described previously in the roentgenographic literature.

In the case cited there was found in the upper part of the clavicle a canal about 2 mm. in diameter which



appeared in the roentgenogram to be 7.5 cm. from the sternal and 6.5 cm. from the acromial end of the clavicle. It ran almost sagittally. When the x rays were directed from 5 to 10 degrees laterally, it could be seen only very indistinctly or not at all.

Of 1,000 selected cases a unilateral canal of this kind was demonstrable in 15. In 6 it was very distinct. In 7 other cases it was very probably present. Of 4 cases in which such a foramen was suspected further examination revealed it in 3.

On palpation of the clavicle in the case reported a distinct depression somewhat larger than a rice seed was found at the site of the anterior opening. Pressure at this site or just below it produced definite pain which was more severe than that produced by pressure on the immediate surroundings of the foramen. The depression felt something like the foramen of the mandible.

On the injection of a drop of 2 per cent novocain solution into the base of the palpated depression pronounced diminution but not complete loss of sensation to touch and pain occurred after a short time in the corresponding region. From this fact it may be assumed that a branch of the median supraclavicular nerve ran through the canal. A blood vessel has never been known to run through the canal and a nutritive foramen never runs transversely through the clavicle. The position of the canal close to the center of the clavicle also agreed with anatomic findings.

None of the patients questioned had any symptoms from the anomaly. Clason regards it as possible that on marked depression of the clavicle definite pain may occur in the region of this nerve when the nerve is only slightly movable or is fixed in the canal.

Roentgenographically this canal has never appeared as a trough although Cruveilhier reported that sometimes it is bridged over by a tendon. However the author has never observed the latter condition.

LOUIS NEUWEIT, M.D.

Shull, J. R. Asbestosis. A Roentgenological Review of Seventy One Cases. *Radiology* 1936 27: 279.

The author very briefly reviews the literature on asbestosis citing the report of Murray in 1906 that of Cooke in 1924 and that of Mills in 1930. He defines asbestosis as a disease of the lungs caused by the inhalation of asbestos dust and fiber. The condition is characterized roentgenologically by an early interstitial fibrosis progressing to a terminal diffuse fibrosis. With its advance, a ground glass appearance of the lung fields develops and there may be enlargement of the right side of the heart. A characteristic pathological finding is the presence of peculiar golden yellow asbestos bodies in the lungs. The most striking clinical symptom is slowly progressive dyspnea. Cough and expectoration may be absent. Anorexia, cyanosis and emaciation are late manifestations and usually out of proportion to the physical signs.

The author made a stereographic and roentgenoscopic examination of the chests of 56 white males, 8 negro males, and 6 white females who have worked in an asbestos plant. The time of exposure of these persons to the asbestos dust ranged from sixteen months to twenty one years. Eight (11.3 per cent) of the subjects had pulmonary tuberculosis. Of the 5 who have died since the examinations were made autopsy was performed on 2.

In 16, the involvement was slight; in 35 moderately advanced and in 20, markedly advanced. The author states that slightly advanced cases may not be recognized without a history of exposure.

The roentgen finding in the slightly advanced cases is a filmy, hazy appearance in both lung bases. In the moderately advanced cases there is interstitial fibrosis radiating to the periphery and producing a ground glass appearance in the lung fields. The bronchovascular markings are increased and pericardial and pleural thickening are noted. Right sided cardiac enlargement is more frequent and emphysema is common. Of the 20 persons with far advanced asbestosis only 1 presented no roentgen evidence of right sided cardiac hypertrophy and only 1 no evidence of emphysema. Nearly half of them had pericardial and pleural thickening and in the majority the left diaphragm was elevated.

The findings in the 2 cases coming to autopsy are described. In both of these cases extensive pleural thickening and fibrosis of the lungs had occurred. In the first case an area of caseous pneumonia in the central part of each lung and other smaller areas of similar structure were found. In the second case there were scars in the lungs which suggested healed tubercles. In neither case was a definite diagnosis of tuberculosis made but in both of them asbestos fibers were seen in the lungs.

The author has noted that in a fair percentage of the slightly advanced and moderately advanced cases the condition tends to improve. He believes that asbestosis is not primarily a progressive condition.

HAROLD C. OCHSNER, M.D.

Later, W. M. Ottell, L. S. and Hussein, H. H. Hepatosplenography with Stabilized Thorium Dioxide Sol. A Follow Up Study of 200 Patients Examined Over a Period of Five Years. *Radiology* 1936 27: 391.

The authors review their experience with hepatosplenography over a period of nearly five years and in more than 200 cases. The opaque medium employed was thorotrast, a stabilized colloidal solution of thorium dioxide containing approximately 22 per cent of metal by volume. This substance when injected into the blood stream is rapidly removed and engulfed by the reticulo endothelial cells. As such cells are most numerous in the liver and spleen these organs can be demonstrated roentgenographically. The average dose employed by the authors was at first 75 c. m. given in divided doses of 25 c. m. on successive days. It is now 0.5 c. m. per pound of body weight. The roentgenograms

are taken on the fourth day with the patient in the prone position on the Potter-Bucky diaphragm and the tube centered over the ensiform cartilage. The factors are 67 kvp at 30 ma for six seconds at a distance of 30 in. No compression is made.

The liver casts a relatively homogeneous shadow of approximately the same density as that of the spine. Apparently there is no absolutely normal size. Considerable variation in size is noted in roentgenograms taken at short intervals. The shadow of the spleen has normally a density slightly less than that of the liver and about the same as that of the ribs. It is usually homogeneous, but occasionally uniformly mottled. Normally it covers an area of 2 intercostal spaces extending from the ninth to the eleventh rib. Considerable experience is necessary to avoid attaching too much importance to minor variations in the shape and size of the liver and spleen.

Hepatosplenography is of value in determining the nature of a mass in the upper part of the abdomen. In most cases it has been possible thereby to determine whether the liver or spleen is involved. In atrophic cirrhosis the liver shadow may be of normal size, either finely mottled or homogeneous, and of reduced density, or a small, diffusely mottled shadow with small areas of opacity in a background of greatly lessened density. The spleen is practically always moderately enlarged. In hypertrophic cirrhosis the liver may become quite large and cast a homogeneous shadow of lessened density, sometimes with a suggestion of mottling. The spleen is moderately enlarged.

Hepatic syphilis or hepar lobatum is characterized by gross deformity and lobulation frequently associated with mottling of relatively large areas of the liver. The spleen may appear to be quite large.

Metastatic malignant lesions may be distinguished when they are present in moderate numbers and are of more than microscopic size. There are multiple rounded areas of varying sizes and of greatly reduced density, usually surrounded by a halo of increased density. Diffuse primary carcinoma of the liver is difficult to differentiate from extensive metastatic involvement on the basis of the roentgen appearance alone. Abscess and cyst should be easily distinguished from each other as the edge of an abscess is fuzzy while that of a cyst is sharper.

The roentgen picture of amyloidosis is almost identical with that of hypertrophic cirrhosis of the liver except that there is not the slightest suggestion of mottling.

For the determination of rupture of the spleen or liver the injection of 25 ccm of the solution is sufficient.

Experience has shown that it is seldom possible to determine the cause of severe jaundice not due to cirrhosis or associated with metastases. Ascites is easily demonstrated, the liver and spleen being separated from the lateral walls of the diaphragm.

In the diagnosis of diseases the spleen hepatosplenography is of very little value. While contra-

indications to its use have not yet been established, it should not be employed unless more simple methods of diagnosis have failed.

Of the 200 cases reviewed, hepatosplenography was found of value in 156. In 49, the diagnosis was made almost entirely on the basis of the roentgen findings. The use of thorium dioxide in the form and amounts discussed is apparently harmless. Although most of the patients studied were suffering from rapidly fatal diseases, 47 were alive and in good condition months or years after the injection. Histopathological study in 71 cases indicated that the presence of thorium dioxide has caused no appreciable organic changes.

HAROLD C. OCHSNER, M.D.

Friedman, H. F., and Drinker, P. Radiation Sickness: Its Possible Cause and Prevention. *Am J Roentgenol*, 1936, 36, 503.

Having been convinced that irradiation sickness is the result of the combined effect of an extraneous factor breathed in by the patient and the effect of the irradiation upon the body, the authors endeavored to ascertain the nature of the extraneous factor.

In rooms where irradiation was given they made analyses of the air with special reference to ozone, nitrous gases, and ion content. It was found that the amounts of ozone and nitrous gases were negligible whereas the ion count was vastly in excess of the normal. With the purpose of counteracting untoward effects which the latter might have, a mask or dust respirator face piece to which was attached either a small cartridge containing activated charcoal or a circular disk of fine mesh wire cloth suitably grounded was used. Of 24 cases in which 437 high voltage roentgen treatments were given for various conditions, this proved effective in 92 per cent. The results, together with other information relative to the patients, are tabulated.

ADOLPH HARTUNG, M.D.

Leddy, E. T. The Causes of Roentgen-Ray Dermatitis Among Physicians. *Am J Roentgenol*, 1936, 36, 570.

This article is based on the cases of 55 physicians who presented themselves at the Mayo Clinic for advice regarding, or treatment of, roentgen ray dermatitis during the period from 1919 to 1934.

Eight of the physicians had been injured while undergoing roentgen treatment for a benign condition. In no instance had the treatment been given by a radiologist or dermatologist.

Forty-five had been injured in using the roentgenoscope in their practice. The majority had employed it in the reduction of fractures or the removal of metallic foreign bodies. A few had used it for chest examinations in tuberculosis surveys or for examination of the gastrointestinal tract. Forty-four were not radiologists. The radiologist had been a pioneer in roentgen work and was exposed to excessive irradiation before the possi-

bility of injury therefrom was recognized. None of the 45 physicians wore lead rubber gloves regularly during roentgen examinations.

The author concludes that the causes of roentgen ray dermatitis among physicians are (1) the use of the roentgenoscope without protection of the hands and (2) the use of the roentgen rays without sufficient roentgenological training.

ABRAHAM HARTUNG M.D.

## RADIUM

Zwerg H. G. and Hetzar W. The Occurrence of Radionecrosis in Bones. A Clinical and Experimental Study. (Ueber das Zustandekommen von Radionekrosen am Knochen. Eine klinische und experimentelle Untersuchung.) *Arch f. klin. Chir.* 1936 135 337.

Radionecrosis of bone occurs almost exclusively in the mandible following radium irradiation by means of implantation. It has not been observed following x ray irradiation. Bone destroying processes following irradiation are found most frequently in patients whose teeth and oral hygiene are poor. Therefore more attention should be paid to the care of the mouth.

In order to study the effect of radium upon adult bone tissue doses of from 100 to nearly 600 mgm. hr. were given to rats and guinea pigs by placing 1

or 2 platinum iridium containers with 2 mgm. of radium element in each directly upon the femoral diaphysis after it had been surgically exposed. The primary damage of the blood vessels by the irradiation led to gradual necrosis of the bone tissue. Like Dahl the authors found the first injurious effect of the irradiation to be produced on the vascular system. When the resorptive processes are unrestrained the injurious effect is manifested grossly by fractures and the extrusion of devitalized bone. Clearly demarcated inflammatory processes are never observed in radionecroses. Only a specific bland atypical radio-inflammation may develop in the poorly vascularized marrow.

When the experimental findings and clinical observations are compared a definite difference is noted. Clinical observations indicate that infection must play a rôle in the occurrence of radionecroses at least in those occurring in the mandible while the experimental histological picture indicates very definitely that injury of the blood vessels is the chief factor in the bone destruction. It is assumed that the vascular destruction is the primary factor, i.e., that the changes in the vessels are the principal cause of the necrosis of the bone and that infection which can be reproduced experimentally only with great difficulty is a secondary factor greatly favoring and hastening the development of the necrosis.

(HOLLNBERG) WILLIAM C. BEECH M.D.

## MISCELLANEOUS

### CLINICAL ENTITIES—GENERAL PHYSIOLOGICAL CONDITIONS

Hill, L. C. Traumatic Edema. A Pitfall in Physical Medicine. *Brit M J* 1936, 2 623

Hill describes the symptoms, signs, and roentgen findings in traumatic edema and reports 4 cases. The characteristic roentgen findings are an uneven osteoporosis with, in the later stages, periarthral thickening.

After reviewing the results of physiotherapy and mobilization and of immobilization, Hill discusses the 3 main theories regarding the production of traumatic edema—those ascribing the condition to disturbances of the circulatory, lymphatic, and sympathetic nervous systems. He concludes from experimental evidence that changes in the lymphatic rather than the circulatory system are responsible, and that persistence of the edema is due to the development of abnormal influences from the high sympathetic centers.

He believes that the condition can usually be prevented by correct treatment and the avoidance of early mobilization in cases of fracture. He states that in an established case early immobilization with elevation and complete rest will not only greatly reduce the period of incapacity but will prevent fibrosis. He considers the application of physiotherapy before the very late stages as unjustifiable. He believes that periarthral sympathectomy and the removal or suppression of the sympathetic ganglia involved offers great advantages.

WALTER H. NADLER, M.D.

Clements, F. W. Tropical Ulcer, with Special Reference to Its Etiology. *Med J Australia*, 1936 2 615

Tropical ulcer is an acute sloughing ulcer which usually occurs on the leg below the knee. It may be superimposed upon a wound or may appear apparently spontaneously. Unless it is treated early and vigorously, much tissue destruction may result.

The development of simple wounds into tropical ulcer can be prevented by prompt treatment of all scratches and cuts with an antiseptic such as tincture of iodine. While this treatment is possible in the cases of plantation laborers and while many plantation managers conduct weekly inspections, when all cuts and superficial wounds, however trivial, are treated the village natives present a difficult problem. In New Guinea and Papua the attempt is made to station a native in every village to give first aid treatment to the inhabitants. This native is trained in simple first aid procedures and supplied with a collection of simple drugs, lint, wool, and bandages. The plan works out satisfactorily when the trained native is efficient and energetic and the village consists of houses grouped together,

but when the houses are scattered miles apart the native medical assistant is able to render first aid only in serious cases.

While the author presents the problem of prophylaxis from the New Guinea and Papuan aspects, he states that it is equally difficult to solve for all native races. The greatest hope lies in raising the standard of living of the natives among whom tropical ulcers are most frequent.

J. THORNWELL WITHERSPOON, M.D.

Masson, J. C., and Montgomery, H. The Relationship of Acanthosis Nigricans to Abdominal Malignancy. *Am J Obst & Gynec*, 1936, 32 717

Acanthosis nigricans is probably attributable to a lesion or functional disturbance of the abdominal sympathetic system. Its occurrence in an adult frequently signifies an associated malignant lesion in the abdomen. The condition is probably much more common than is indicated by published statistics.

The pigmentation is due to a deposit of melanin in the basal or dendritic cells of the epidermis. It is symmetrical in distribution but most marked in the axillae, on the neck, around the genitalia and other flexural surfaces such as the umbilicus, and under the breast. In this respect it resembles the pigmentation of Addison's disease, but the verrucous and papillomatous changes permit both clinical and pathologic differentiation.

In the juvenile type the prognosis is good, whereas in the adult type it is grave, especially in the later decades of life.

At the Mayo Clinic 13 cases of acanthosis nigricans have been seen—5 of the juvenile type and 8 of the adult type. In all of the adult type the condition was probably associated with abdominal malignancy. Two of the 8 patients with the adult type are still living. One was operated upon two months ago at the Mayo Clinic and the other five months ago elsewhere.

Next to the stomach, the uterus is the most frequent site of malignant disease in cases of acanthosis nigricans of the adult type.

Peller, S. Carcinogenesis as a Means of Reducing Cancer Mortality. *Lancet*, 1936, 231 552

Statistics on the mortality of cancer of various organs in certain occupations and the relationship between cancer morbidity and pregnancy conflict with the theory of the local origin of cancer. Analyses show that an increase of carcinogenic irritation leads to an increased incidence of cancer at the irritated spot, but there is no corresponding rise in the total incidence. Increased irritation leads also to a decrease in the incidence of cancer in some of the other organs.

If malignant tumors decrease in organs that are not at all, or hardly, accessible to treatment, this

transfer of the site of the primary tumor means a decrease of cancer mortality although the morbidity remains the same or may even be slightly raised.

The significance of carcinogenic irritation in cancer now takes on quite a different aspect. Through increased irritation an active transfer of the site of the primary tumor may be effected. By the application of light rays to suitable surfaces of the skin in an intensity that is just sufficient to provoke skin cancer it may be possible to reduce the number of in accessible and more malignant cancers. The necessary amount of irritation could probably be produced by the use of tonsil extracts as they increase the susceptibility of the skin to light rays.

J. LEH K. NARAY M.D.

Rehn, E. Rehabilitation Surgery, including the Evaluation of Free Transplantations: a Review and the Present Status. *Wiederherstellung des chirurgie einschliesslich der Verwertung freier Transplantationen. Ueberblick und heutiger Stand.* *Die Tag d. deutsch. Ges. f. Chir. Berlin 1917.*

The author first discusses the chief purpose and nature of rehabilitation surgery, its special value for the social fate of those injured in accidents and in war and then takes up in particular free transplantations. He states that free transplantations have taught the surgeon greater technical refinement of his art. They have become guideposts for the biological thinker. The life proceeding from the transplant and its surroundings moves along the same paths as the life of the organism as a whole.

The growth of the organism is due to hormonal stimuli. A powerful additional stimulus to form in the prematurity period is function. However function merely shapes and models. The only growth force which is creative is the hormone. A third influence to be mentioned is the organization center which is responsible for the development of the organism with forms in harmonious relationship and which lays the groundwork and directs the later modeling. From the example of acromegaly we now know that an abnormal hormonal stimulation may result in an abnormal increase of growth in limited areas even in the mature organism. This is evidence of the power of hormonal action and shows also that, under normal conditions there must be somewhere a regulator controlling the secretion and activity of the hormone. We are therefore forced to the assumption that an organization center such as Spemann demonstrated for the earliest period of development of the organism exists and acts in the same or a similar manner also in later life. This center governs the powerful hormonal forces. Therefore when we look about for driving and modeling forces which exert determining influences on the originating developmental growing maturing and later stages of the organism and on the healing processes after surgery the following conclusions may be drawn:

1. Every cellular reaction, increase of cells, tissue budding and consequent healing, regeneration, and

change and healing in of transplants is a hormone determined manifestation of life.

2. The final character of the tissue is determined by the specific stimulus of a particular function. From young undifferentiated connective tissue various kinds of tissue of a higher order can be developed.

3. We must still seek an explanation for the phenomenon noted in all healings, regenerations and transplantations, the truly wonderful harmony. In the individual organism these forces, which are always active not only in the individual organism but also in the cosmos, have their origin in the germ plasma. The organization center discovered by Spemann directs this force and upon it and also we must depend in every reparative procedure. This harmony in formation and transformation, which is noted in the healing of tendon wounds and in the healing in of transplants, is the effective expression of function. There are not only clinical observations but also experimental findings to which this mechanistic explanation is applicable.

Rehn cites the transformation of connective tissue infiltrated with fat into a finished tendon which satisfies the strictest anatomical and physiological requirements.

He then mentions briefly the difference which once existed between his view and that of Bier. Bier emphasized the hormonal and Rehn the mechanical influence. It is now known that both views are correct. The life creating force is the hormone and the shaping force is function. Successful results in numerous fields of reparative surgery are due to 3 forces in the organism, each with a different action: (1) the hormonal force determining cellular reaction, (2) the functional stimulus, which determines shape, and (3) a dominating and harmonizing force proceeding from the organization center. The importance of function has been recognized for a long time but our conception of it has been very crude. As function we have understood only voluntary muscle innervation expressed in movement. Rehn believes that from the standpoint of surgery he has demonstrated the occurrence of a muscular state which acts as a functional muscular stimulus even without visible external muscular activity. In certain body conditions this hypertonic state of muscle which Rehn has been able to register and define with exactitude is maintained by a dominant center as long as it is needed as a mechanically effective vital factor. In view of this discovery, anxiety lest fixation be applied too long in cases of gaps in tendons and after transplantations is just as needless as are efforts to promote callus formation and bone healing by early voluntary movement that is by allowing movement of the muscles of the extremities. Whatever a fracture site requires of cells, material, and functional stimuli the organism supplies in full measure even under a plaster cast. How otherwise are we to explain the wonderful processes which occur in the filling in of a bone defect?

However while the body shows truly astounding capacities in this transformation of transplants it is

nevertheless unable to bridge over such a defect by itself alone. The ability to join bone to bone by bone has been lost to it. Scar remains scar, but wherever bone specific cells are alive, even if they are in a dormant state, they are stimulated by the specific stimulus of the bone transplant, even if the transplant is destroyed. Here we have a primary and important action of the transplant, the specific cellular stimulation which is able to call forth great activity on the part of the cells.

Cell energy and cell growth are dependent upon endocrine stimuli. We now know that the pituitary gland is a center for the production of hormones, and that, by stimulation of the thyroid gland among others, the anterior lobe of the pituitary gland sends out very important vital energy by the hormonal route. Sauerbruch presented definite proof of this (cure of Simon's disease by the administration of sheep pituitary). When, therefore, a few years ago Rehn's assistant, Eitel, reported his remarkable findings in the thyroid after stimulation of that organ with the thyrotropic hormone, Rehn urged him to make use of this marked stimulation of the thyroid cells for homeoplastic transplantation of the organ. The effects of the hormone which first impressed Rehn were its marked action on the circulation and its stimulation of all the vital processes which are known to be determined by the thyroid. A year ago Rehn presented a report on these effects and called attention to an important observation concerning the course of infections. Since then his theory that thyroid gland stimulation is capable of exerting a very favorable influence on the course of stubborn wound infections by increasing cell vitality has been further confirmed by clinical observations. Moreover, a surprisingly good effect on the healing of fractures, evidenced by very early and unusually active fracture hyperemia, has been demonstrated experimentally by Eitel. Rehn cites some very good clinical results.

All this shows that the stimulating action of the hormone is not limited to the morphologically demonstrable change in the thyroid gland itself, but is exerted on all of the body cells through the thyroid. In every kind of transplant this means a heightening of cell resistance and cell function. The success of free transplantation depends not only on the character of the transplant, but also, and no less, on the behavior of the tissues at the site where the transplant is placed. In fact, some have gone so far as to ascribe the decisive rôle to the bed of the transplant and to deny that the transplant itself has any active rôle. This view is not accepted for the most important tissues and can be supported only for heteroplasties and for the transplantation of dead tissue. Rehn cites Carrel's tissue cultures. The successful cultivation of a small cell complex of fibrocytes under artificial conditions over a period of eighteen years in more than 2,000 subcultures is certainly excellent proof that connective tissue and all other kinds of supportive substances will continue to grow under the far more favorable condi-

tions of autoplasty. These microbiological methods with which Spemann has worked yield valuable information regarding cell conditions, cell reactions, and cell metabolism. They deserve greater attention from surgeons.

Defective healing in of a transplant due to a poor reaction of the stroma was formerly attributed chiefly to local conditions. However, the result depends equally upon organic influences. For example, the dependence of fracture healing on intact innervation is shown by experiments in nerve resection which prevent hyperemia and callus formation. Moreover, in accordance with the law of conservation of force, muscles with voluntary innervation are of decisive importance for all healing and healing in processes taking place in their vicinity. In this connection Rehn refers to his own investigations. However, all these stimulating factors and all observed manifestations of vital processes, among which he includes hyperemia, serve the one aim of cell function. In every instance the functioning of the cell is the central point and upon this depends especially the behavior of the bed of the transplant.

Not very rare are cases in which, in spite of the reactionless healing in of a bony transplant, local or extensive late absorption sets in and renders the result doubtful. Sometimes, also, a wound inflammation, which is at first unimportant, develops into a stubborn fistulizing suppuration which may ultimately result in expulsion of the transplant. While it is true that this deficient cell function and cell resistance is local, the assumption of a general disturbance seems justified by the observation that patients with such a condition, even when they do not appear to be very ill, suffer surprisingly often from a pronounced sluggishness of liver function which is manifested by their basal metabolism.

Since the entire tonus of the organism and the increased cell function which must be stimulated when a transplantation is done are determined by hormone activity, failure must be due to hormonal disturbances somewhere in the organism. It is therefore evident that in this special branch of surgery more attention than previously should be paid to the hormonal processes. The active substance is the anterior lobe of the pituitary gland, to which the body responds even in advanced age. Experience has demonstrated that even when weakened by disease the organism completely retains its ability to react to hormonal stimulation. This knowledge places in our hands a most valuable means to assure the success of rehabilitation surgery, especially free transplantation. Rehn values such treatment, which makes a central attack and acts by way of the thyroid gland through a general and total stimulation, far above all methods which aim at producing a local cellular stimulation.

To surgeons who wish to bring about better healing of fractures by supplying "building material" it should be said that this treatment is in no way disturbed by hormone treatment. Hormone treatment is directed against deficient functioning of the

cells whereas vitamin treatment is effective only against avitaminosis i.e., the deficiency disease. This difference is of great importance, especially in specific treatment but does not prevent judicious combined treatment.

Bone becomes joined to bone most rapidly, most certainly, and most firmly when it is possible to bring wide wound surfaces together and to hold them firmly in apposition. This is true not only in the open treatment of fractures, the treatment of pseudarthroses, and free bone transplantations in general, but also in every corrective bone operation on the extremities, especially in the adult. Rehn has therefore modified also Wolff's osteotomy and applies the same principles to the straightening of deformed limbs.

The choice of the transplant is determined by whether the transplant is to serve as a pillar and girder or as filling material. The function of pillar and girder requires massive bony trabeculae which are obtained best from the tibia. For bony filling, the bone may be taken from the crest of the ilium which, as is well known, is so resistant to strain that it may be employed for replacement of the lower jaw. If a graft taken from the crest of the ilium is to be used for support, it must be supported by a steel splint for the first few months.

For the filling of defects in the skull, even of large size, Rehn uses exclusively the ventral surface of the ilium. In the statistics of plastic operations on bones there are 30 reports of the use of alloplastic material, viz. small steel splints of rustless Krupp steel. Rehn uses these with excellent results in the open treatment of fractures on the basis of the following indications:

1. Where, because of a broad layer of spongy bone, good healing may be expected, e.g., fractures of joints and in the neighborhood of joints. The use of rustless steel splints as a secondary procedure in cases of badly comminuted fractures of the epiphysis of the radius has developed into a typical operation. This intervention, which aims at restoring the normal articular axis, is performed after the bony fragments of the epiphysis have united (six weeks).

2. In multiple fractures when the amount of autoplasmic bone material required for splinting would be too great (combined with free osteoplasty).

3. In the region of the diaphysis in children when conditions are favorable for healing. When bone transplantation is done the immobilizing wire loop of Krupp steel may be left in place. Otherwise it is always removed at the end of from six to eight weeks because of the danger of pressure.

Krupp rustless steel is unrivaled in its resistance to acids and its strength. However, with its great resistance to breaking it has very slight extensibility. Therefore caution is necessary in the use of Krupp wire where, without a yielding transplant, bones would be pressed together by the tightly drawn wire loop. In flexibility, the old bronze aluminum wire is superior to the Krupp wire. We need an alloy which will combine such flexibility with resistance to acids.

Of the many uses to which bone transplantation can be put when there is no special demand for supportive strength, Rehn cites the method of mediastinal fixation by means of a graft from the tibia. On experimental and clinical grounds this is indicated in extensive resections of the sternum in the upper segment and in cases of flaccid mediastinum. When because of the extent of the disease process, as in extremely severe blastomycosis, it is necessary to remove not only the sternum but also the skin and when, in addition, the anterior mediastinal space must be emptied, it is advisable to separate the two large pectoral muscles from their beds with the two mammary glands and displace them medially. The mediastinum is fastened to their midline junction. Rehn has obtained excellent results from this procedure.

Since Rehn agrees with Sauerbruch that recognition of the unity of the rigid thoracic cage with the mediastinum is essential for progress in the field of thoracic surgery, he considers this problem in connection with rehabilitation surgery. He mentions the new procedure for examination of the anterior mediastinum, mediastinography, and the subternal artificial stiffening of the anterior mediastinum with the thoracic cage closed as a supplement to Sauerbruch's differential pressure method. The mediastinal reinforcement produced in the first stage of Graf's operation gives this operation an importance far beyond that which its originator supposed it to possess.

Large statistics show that a other varieties of tissue, fat and skin, are used for transplantations comparatively frequently. They are employed, not because of preference for daughter tissues, but because fat and skin serve so well for plastic repair.

Progress in the operative mobilization of stiffened joints is due not only to the plastic interposition of tissue but also to proper treatment of the muscular, capsular, and tendon apparatus. This means that arthroplasty has been completely supplanted by the classical Langenbeck functional resection principle. On this principle the incision and further procedure are based. The shortening of the femur as a measure preliminary to plastic operation on the knee joint also serves this functional purpose. Rehn's reported efforts in plastic repair of the hip and elbow are to be evaluated according to the same principle. The results of arthroplasty today are good. Occasionally, however, failures occur as the result of the flare up of latent infections. This is sometimes unavoidable even when the operation is delayed many years. Failure will never occur when the transplanted fatty tissue is to serve as a loose tissue buffer, as in dermoplasty, or as a sliding mantle, as in replacement of the pericardium or in neurolysis. Rehn recommends it, use also in arachnitis adhesiva spinalis, whether the inflammation is of a non-specific or a tuberculous nature. Success is certain if the diseased dura is thoroughly resected together with adherent soft meninges and its attachments are carefully liberated. In Rehn's cases the longest duration of cure is now more

than two years. In arachnitis adhesiva spinalis, also, the indications should be determined with care. When, in this condition, operation is performed on the medulla oblongata and there is a secondary internal hydrocephalus, a plastic operation with the use of fat is contra indicated. Under such circumstances it is sufficient to resect the indurated choroid plexus with the thickened soft membranes. If, in addition, a markedly engorged vein occludes the foramen Magendi, Rehn doubtly ligates and removes it. By this procedure he has obtained successful results.

As is well known, fatty tissue is particularly well suited for plugging cavities in the brain as well as for plastic repair of the dura.

A frequent cause of recurrences of traumatic epilepsy after successful duraplasty and bony repair of the skull defect is ventricular cyst. Among the cases which Rehn treated by opening the cyst and plugging with fat was one in which the cyst, almost as large as a fist, had developed in the course of years in the anterior horn following several plastic operations in the region of the frontal lobe, its membranes, and bony covering. The primary cause was trauma. In the depth of the cavity, which had the appearance of a hollow sphere, the opening of the lateral ventricle was clearly visible and fluid was seen trickling from it constantly in clear drops and falling into a small lake of fluid. The septum pellucidum was clearly visible toward the midline. A flap of fatty tissue about the size of a fist, which completely filled the cavity, healed promptly, and cure resulted.

Another field in which the use of fatty tissue for plastic repair gives very gratifying results is the correction of facial disfigurements due to scars, distortions, and other defects where fatty tissue competes with bone and cartilage. The so called cosmetic surgery, which is useful in dealing with psychopathic and hysterical persons, is not included by Rehn in rehabilitation surgery.

Rehn discusses also the transplantation of skin and fascia. He states that fascia is more supple and finer whereas the derma is more compact and resistant. The importance of such transplants in the treatment of abdominal and other visceral hernias is apparent from the statistics. Although, because of special experience and special technique, Rehn rarely rejects the radical operation, he performs it only on strict indications. Cutoplasty is used chiefly for ruptures of abdominal scars. However, in suitable cases the cutis procedure can be used also for replacement of the ligaments in flail joint. Tears of the capsule or ligament are not discussed, but a new method of preventing abnormal joint movements by attachments from muscle to fascia or from muscle to muscle is described.

In the hands and fingers tendon suture far surpasses free replacement of tendon by tendon, fascia and cutis. Rehn's experience has shown that especially secondary tendon suture requires temporary protection against the strong mechanical irritants

peculiar to muscle which always become active after tendon division. Therefore, for several years, he has used fourteen day thread extension above the proximal tendon stump to relieve tension on the tendon suture.

Restorative surgery on the blood vessels is still a rare undertaking although during the last few years Rehn has done a few vessel sutures and embolectomies and 4 vessel transplantations. He emphasizes, however, that in times of peace we should not forget the brilliantly successful results of vessel suture in injuries to vessels sustained in war. Moreover, we should take care not to lose the knowledge gained thereby or forget the technique. In every surgical procedure on a traumatic aneurism the size of the vascular defect and the elasticity of the vascular tube must be considered since, according to Poisseul's law, these determine the volume outflow per second and hence the result. Rehn demonstrated this in experiments which he carried out with Achelis and Tschmarke. That they determine also the later fate of an extremity was demonstrated by a case in which, nineteen years after the ligation of an aneurism of the femoral artery, deficiency of the supply of blood led to marked atrophy of the foot with beginning necrosis. How very different is the result after repair of a vessel defect by free vein transplantation is well shown by arteriography.

In conclusion Rehn says that rehabilitation surgery is the original field of surgery. It is the most important basis of every surgical achievement. To the surgeon who obtains complete mastery in this field is awarded the satisfaction of free creative action. He who wholly neglects it ceases to be a surgeon.

In the discussion of this report, KIRSCHNER (Heidelberg) stated that free transplantation of bone should be reserved for cases in which the simpler procedure of osteosynthesis does not appear to promise success. Therefore, when a quantitatively sufficient and a qualitatively suitable bone material is available, as is the rule in the correction of crooked bones, free bone transplantation is not necessary and all requirements can be met with the usual aids of wire sutures, screws, or plating. Free bone transplantation should be limited strictly to cases in which the bony material available is of inferior quality (pseudarthroses) or in which there is a bony defect. Kirschner described a complete set of instruments for bone suture. He has found of particular value H shaped splints which can be cut in one piece according to measure and fastened to the bone with screws or wire or both.

(RENN) LORENCE ANNAN CARPENTER

Fredet, P. Surgery on Diabetics. General Surgical Conditions in Diabetics (La chirurgie chez les diabétiques. Les conditions générales de la chirurgie chez les diabétiques). *J de chir.*, 1936, 48: 499-519.

The diabetic patient presents a special problem to the surgeon. His wounds heal with difficulty, he is especially sensitive to infections, and his metabolism



is in such an unstable state that operative trauma, a slight infection, or the toxic action of the antiseptic may disturb it and thereby cause the development of coma. This is true even in mild diabetes. In the severe types with acidosis or dehydration the danger is greater. While at first complicated chemical tests may be necessary for scientific study of the patient's condition or to determine certain elements of the treatment with precision, a few simple tests are sufficient for subsequent direction of the treatment and control of the condition.

The diabetic state and especially the hyperglycemia interfere with the healing of operative wounds and predispose the patient to infection. Inversely the surgical disease and the operation aggravate the diabetes. The metabolic disturbances that follow surgical operation temporarily are very similar to those that are present permanently in diabetes and naturally aggravate the latter. One of the most important factors producing the postoperative disturbances is the anesthesia. In the non-diabetic, general anesthetics such as chloroform and ether cause a disturbance of the glucose metabolism with hyperglycemia, a disturbance of the acid base equilibrium toward acidosis with ketonemia and ketonuria and a marked breaking down of the endogenous proteins with an increase of nitrogen in the urine. As these disturbances are largely avoided or are less marked when local or regional anesthesia is used, anesthesia of this type appears to be preferable for diabetics.

When surgery on a diabetic patient is not an emergency measure time should be taken to reduce the blood sugar and balance the metabolism before the operation is attempted. Even in cases of mild diabetes with hyperglycemia but without ketonuria the blood sugar should be brought to normal by diet and small doses of insulin. Too marked a reduction in the carbohydrate intake should be avoided. The author favors a diet of green vegetables for two or three days at the beginning of the pre-operative treatment. Usually from 10 to 20 units of insulin daily are sufficient but occasionally 30 units may be necessary. In cases with ketonuria, the proteins especially the animal proteins of the diet must be reduced. The carbohydrates should not be too greatly restricted, but should be balanced with insulin. Larger doses of insulin must be used in these cases than in those without ketonuria.

If a pre-operative purge is desired in the case of a diabetic patient, castor oil should be used instead of a saline purgative and should be given in divided doses. To prevent dehydration alkaline fluids should be given by mouth, and if necessary physiological saline or Ringer's solution subcutaneously. Carbohydrate in an easily digestible form such as orange juice or glucose solutions should be given three or four hours before operation.

Operation should be done preferably under local or regional anesthesia. It should be performed as rapidly as possible but with gentleness and care to prevent trauma to the tissues. Immediately after

the operation a few units of insulin with an injection of glucose solution should be given.

In the postoperative period large quantities of fluid should be administered. As fluid cannot be given by mouth at first sodium chloride and glucose solution should be given by injection with insulin to balance the glucose. The urine should be frequently examined for sugar and ketone bodies and the insulin dosage (balanced with glucose) regulated accordingly. If coma develops insulin should be given by intravenous injection at frequent intervals until consciousness is restored.

In the case of an emergency operation on a diabetic it is of course impossible to reduce the hyperglycemia and regulate the metabolism prior to the operation. The matter of chief importance is the prevention of coma. This is done by giving insulin and glucose solution in doses regulated by the amount of glycosuria and ketonuria. After operation a more thorough study of the case may be made and the treatment regulated accordingly. Statistics from various clinics, especially those from the Mayo Clinic indicate that the incidence of coma and the postoperative mortality in cases of diabetes have been very definitely lowered since the introduction of insulin and since pre-operative treatment has been given routinely. ALVIN M. MINTZ.

Read A. R. Some Considerations of the Problems of Wound Healing. *New England J. Med.*, 1934, 211, 753

Read is of the opinion that as regards wound healing bacterial contamination of a wound is probably of no greater importance than necrosis, debris, and devitalized tissue and that probably a great deal of harm is being done today by the use of chemical antiseptics in wounds. Of great importance is physical rest of the part, a fact not sufficiently appreciated by the medical profession. Frequently contused wounds do not progress as satisfactorily as compound fractures of the extremities which are treated by plaster dressings which place the extremity at complete rest. An adequate blood supply to the wound is of paramount importance in healing. Edema of the surrounding area which decreases the blood supply is detrimental to satisfactory healing. The application of sutures and a dressing which will permit the escape of serum and prevent tension is desirable.

Ideal hemostasis is necessary for satisfactory healing because a hematoma by increasing the tension further interferes with the blood supply. However, healing may be interfered with by too many unnecessary ligatures of the small blood vessels and too tight sutures.

The prevention of infection and its proper treatment after it has occurred are imperative in the proper treatment of a wound. One should not use antiseptics and disregard careful mechanical cleansing of the skin as is so frequently done. The use of antiseptics on an open wound is not physiological because an antiseptic which is strong enough to kill

bacteria will injure the living cells of the body. Moreover, conditions in the wound which favor wound healing are favorable also to the growth of micro organisms, and measures which alter these conditions have an unfavorable effect on the body cells as well as on the bacteria. "When the wound is relatively sterile, the adoption of a policy of rest, optimum temperature, and non interference may result in a rapid healing until the multiplication of organisms becomes so numerous that the plasma or medium for the growth of cells is all devoured by them. Then healing comes to a halt and attempts at further sterilization are in order." The use of strong antiseptics is to be condemned because of their necrotizing effects on the living cells. The best treatment of a fresh wound consists in simple washing of the wound and the removal of necrotic devitalized tissue that is, debridement, with later protection by a bland dressing and immobilization.

Granulation tissue protects an infected wound and should not be disturbed. Frequently granulation tissue is interfered with by infection. Under such conditions the granulations can usually be freed from infection by the use of a mild germicide or moist pressure dressings.

The ultimate healing of a wound is accomplished by tissue growth which occurs best when the injured part is at rest and the cells are well nourished by the blood stream. On the surface of the wound is deposited a coagulum of fibrin which is the nourishment for the growing cell extending in from the periphery. If this coagulum is interfered with by the use of antiseptics or by mechanical removal, healing of the wound is disturbed. A bland dressing interferes with the wound relatively little.

Although all surgical wounds are as sterile as they can be made, micro organisms are introduced in practically every instance. The reason why some wounds become infected and others do not is that the natural resistance of the part is less in the cases

in which infection occurs. Resistance is lowered when necrosis and devitalization occur as the result of trauma to the tissues and interference with their blood supply. Care should be taken to grasp and ligate only bleeding vessels. Non viable tissue should be excised. Sharp dissection is preferable to blunt dissection. In Reid's clinic the use of retractors is reduced to the minimum. Sutures are seldom placed in the fat and muscle, and those which are introduced are tied only tightly enough to approximate the tissues. The number of ligatures is minimal, hemostasis being controlled as much as possible by pressure. Drainage is used only when definitely necessary. Abdominal wounds are closed by through and through silver wire sutures far removed from the edges of the wound. Moist dressings are applied and kept moist for a considerable time by means of rubber protectives.

In traumatic wounds the wound is thoroughly flushed with a large quantity of sterile normal salt solution and careful debridement is then done. As few ligatures as possible are placed. Sutures are tied loosely and only to approximate the wound edges.

Infected wounds are treated in a physiological manner, viz. by immobilization of the part and the application of moist dressings. Incision and drainage are done only when suppuration occurs and with care to prevent unnecessary damage to the existing tissue.

If granulating wounds are to be closed by secondary closure, active therapy with bactericides such as Dakin's solution is permissible to sterilize the surface partially before closure. Ordinarily, however, such active therapy destroys the medium responsible for the growth of epithelial cells and is to be condemned. Similarly, gauze dressings may remove the medium at each dressing. Reid advocates the use of vaselined old linen over such wounds.

ALTON OCHSNER M.D.

# BIBLIOGRAPHY of CURRENT LITERATURE

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*Supplementary to*  
Surgery, Gynecology and Obstetrics

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# INTERNATIONAL ABSTRACT OF SURGERY

APRIL, 1937

## COLLECTIVE REVIEW

### A CRITICAL STUDY OF THE DIFFERENT PRINCIPLES OF SURGERY WHICH HAVE BEEN USED IN URETERO- INTESTINAL IMPLANTATION

FRANK HINMAN, M D, F A C S, and HENRY M WEYRAUCH, Jr M D, San Francisco, California

#### Introduction

Part I Implantation of the ureters into an excluded portion of the intestinal tract

Part II Implantation of the ureters into the intact intestinal tract

General summary

Discussion

#### INTRODUCTION

THE following study of the literature upon uretero intestinal anastomosis was undertaken with the object of gaining a better understanding of the surgical problem. Eighty years have elapsed since Simon made the first attempt to divert the urine to the bowel, and in this time more than 1,000 such operations have been performed. Surely something of the surgical principles involved must have been learned. The historical reviews which have appeared from time to time<sup>1</sup> list more or less chronologically the various methods which have been used without distinguishing the principles of surgery upon which each of the different methods is based. Such an analysis leaves something to be desired because the historical material is of importance to the surgeon of today only insofar as it teaches the way to implant ureters more successfully than has been done in the past and in what particulars even the most successful methods are at fault. It must be admitted that the implantation of the ureters into the intestinal tract is a

serious procedure. A few surgeons maintain that the operation always will be dangerous and consequently forever impractical. Naturally every surgeon wants to know whether the procedure is less serious now than it was and, if so, whether improvement is attributable to the introduction and application of newer, better principles of surgery. He then wants to know what these different surgical principles are and why they were advocated. This degree of understanding of the problem is the object of the present study.

All methods for the ureteral diversion of urine may be grouped according to the following classification:

#### I Non intestinal

A To the skin

B To other structures

- 1 Urethra
- 2 Vagina
- 3 Fallopian tube
- 4 Uterus
- 5 Blood vessel
- 6 Meninges of the spinal cord

#### II Intestinal

A Into an excluded portion of the tract

- 1 Completely excluded portion
- 2 Partially excluded portion

B Into the intact tract

Non-intestinal methods of ureteral implantation are not a part of this study. Implantations to the skin, which perhaps do not seriously endanger the life of the patient at the time of operation, permanently place a burden of care and discom-

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<sup>1</sup>Peterson 1900 Steink 1909 Buchanan 1909 Sembanti 1915 Mayo 1920 Papan 1925

fort because of incontinence. The formation of a vesicovaginal fistula is no more than a temporizing measure and implantations to other structures are obviously without merit.

Of the intestinal methods for the ureteral diversion of urine, those to the intact tract have been used most often and fulfill best the surgical requirements. Consideration of these methods

forms the major part of this study. For the sake of completeness the surgical principle of creating a bladder by isolation of a portion of the bowel or of forming a urinary channel by transplanting the ureters into a partially excluded portion in order that the ends of the ureters will not come into direct contact with the fecal stream is given brief consideration.

## PART I URETERO INTESTINAL IMPLANTATION INTO AN EXCLUDED PORTION OF THE INTESTINAL TRACT

Diversion of the fecal stream so as to diminish ascending infection was the idea which prompted partial exclusion of portions of the intestine into which to implant ureters. This surgical principle is discussed subsequently in connection with colostomy, preliminary to implantation. The French and German surgeons who advocated complete exclusion had in mind, however, the production of an artificial bladder which according to Heitz, Boyer and Hovelacque, should assure continence, possess a free unobstructed excretory canal and be accessible for instrumental exploration. With these criteria as the main objects the methods can be classified according to the type of exclusion of the bowel without reference to the method of ureteral implantation<sup>1</sup>, as follows:

### 1 Implantation of the ureters into a completely excluded portion of the intestinal tract.

#### a An artificial bladder made from the small gut.

- (1) Placed under control of the vesical sphincter (experimental only) Tizzoni and Foggi, 1888
- (2) With the end brought out through the anal sphincter Cuneo, 1911

#### b An artificial bladder made from the entire rectum

- (1) *Ileac sigmoidostomy* Mauclaire 1894
- (2) With the sigmoid drawn through the anal sphincter Gersuny, 1898
- (3) With the excluded rectum made to communicate with the urethra for control by the sphincter Lemoine 1912

#### c An artificial bladder made from a pouch of the anterior rectum (experimental only) Lothsen 1899

#### d. An artificial bladder made from the ileocecal region the appendix serving as a urethra Verhoogen, 1908

### 2 Implantation of the ureters into a partially excluded portion of the intestinal tract.

#### a A blind pouch of the lower ileum emptying into

- (1) The ileum (experimental only) Nagano 1901
- (2) The cecum Goldenberg 1904
- (3) The transverse colon Mołowicz 1909
- (4) The sigmoid. Berg 1907

#### b A blind pouch of short-circuited loop of the sigmoid Borelius Berglund 1903

#### c. A blind pouch of the sigmoid emptying into

- (1) The lower sigmoid. Mueller 1903
- (2) The rectum Muscatello 1904

#### d A blind pouch of the upper rectum (experimental only) Decompes 1909

## 1 IMPLANTATION OF THE URETERS INTO A COMPLETELY EXCLUDED PORTION OF THE INTESTINAL TRACT

### A AN ARTIFICIAL BLADDER MADE FROM THE SMALL GUT

(1) *Placed under the control of the vesical sphincter* The earliest attempt to form an artificial bladder was made by Tizzoni and Foggi in 1888. Operating upon a dog these workers completely isolated a loop of small intestine 7 cm. long which they lavaged and converted into a closed pouch by uniting the two ends. The continuity of the intestinal tract was re-established by anastomosis of the remaining ends. One month later the ureters were transplanted (by a method not stated) into the blind loop which in turn was sutured to the neck of the bladder. The animal was alive and well two months later. When in a second dog the entire operation was attempted in 1 stage death resulted after eight days.

(2) *With the end brought out through the anal sphincter* The first clinical operation in which the small intestine was used as a completely isolated urinary reservoir was devised by Cuneo in 1911 (Fig 1 A). By the perineal route the rectal

<sup>1</sup>The method of ureteral implantation in conjunction with an exclusion operation is referred to in Part I under the name of the originator as "direct" or "indirect" or after the classification of surgical principles of Part II of this paper as "direct" (the second surgical principle).

mucosa was dissected free anteriorly to make a cavity 4 or 5 cm long which was to serve as an opening for the new bladder. In the abdominal part of the operation, which was performed immediately, a loop of small gut from 18 to 20 cm long, taken from a point 20 cm above the ileocecal valve, was isolated with preservation of the mesentery. The continuity of the intestine was next re-established by a circular enterorrhaphy and the proximal end of the excluded loop was closed. The distal end of the loop was drawn, by means of a Kocher clamp, through the opening which had been made previously anterior to the rectum, and the edges were sutured to the anal mucosa. Cuneo advised against resecting the excess of ileal mucosa forming a partition with the anus because retraction and scar formation draw up the inferior portion of this partition, producing an incomplete division of the rectum and new bladder.

At a second operation, six weeks later, the ureters were implanted into the excluded pouch intraperitoneally by the technique of Maydl or Berghem.

In 3 cases of exstrophy of the bladder treated by this method there was 1 death from peritonitis. The 2 patients who recovered from the operation suffered from urinary fistulae (Table I).

#### B. AN ARTIFICIAL BLADDER MADE FROM THE ENTIRE RECTUM

(1) *Iliac sigmoidostomy*. Maclaure, in 1895, experimenting with dogs, completely isolated the rectum, implanted both ureters in the invaginated superior end, and used the divided end of sigmoid to establish an artificial anus in the iliac region. He advised the use of ureterorectal catheters which he claimed permitted the surgeon to make an oblique implant in the rectal wall and, at the same time, served for irrigation of the newly formed bladder. Although Maclaure performed no clinical operations he suggested the formation of a perineal anus with the divided sigmoid in man.

The first clinical application of this technique was made in 1905 by Remedi, who executed the entire procedure in 1 stage. Two years later Kroening modified the operation to incorporate 2 stages (Fig. 1 B). In the first stage, carried out twelve days before the second, the rectum was excluded and the iliac anus formed. In the second stage the ureters were transplanted to the excluded rectum by the direct method. Rovsing, in 1915, described a 2-stage technique which was similar except that the ureters were transplanted by Maydl's procedure. In applying the method

to patients suffering from carcinoma of the bladder, Schmieden performed the operation in 3 stages, the third stage consisting of cystectomy. In the second stage he implanted the ureters by the method of Stiles. In 8 cases treated by this method the surgical mortality was 25 per cent (Table I).

In 1923, Myles recommended inguinal sigmoidostomy following ureteral transplantation in order to prevent ascending infection. He claimed that implantation of the ureters is easier with the colon intact. In advising against Myles' suggestion, Dagger, in the same year, expressed the opinion that it is wiser to run the risk of ascending infection than to burden the patient with a colostomy for life.

(2) *With the sigmoid drawn through the anal sphincter*. Still using the completely isolated rectum as a urinary reservoir, Gersuny, in 1898, devised an operation intended to maintain fecal as well as urinary continence (Fig. 1 C). After isolation of the rectum and implantation of the trigone into the divided lumen by Maydl's method, the sigmoid was drawn through an opening made along the anterior margin of the anus and anchored within the anal sphincter so that this structure controlled both the newly formed bladder and the sigmoid which served as rectum.

In 1910 Heitz-Boyer and Hovelacque described their carefully designed anovascular operation which differed from Gersuny's technique in that the cecum was resected and the sigmoid drawn through an opening made posterior to the rectum, within, rather than anterior to, the anal sphincter. They stressed the importance of conserving the blood supply to the rectum, the sigmoid, and the ureters. The ureters were implanted separately by the direct coaptation of mucosa to mucosa. Mikuli, in 1930, described a similar method.

Lastara, in 1913, modified the Heitz-Boyer and Hovelacque operation by stripping the muscularis and serosa from the part of the bowel placed between the sphincter and the rectal mucosa. This procedure was carried out to prevent overstretching of the anal sphincter by reducing the volume of the mass penetrating it.

Melnikoff, in 1924, modified Gersuny's technique by fashioning the skin of the perineum into a channel intended to serve as a urethra for the newly formed bladder. He maintained that such a channel, opening at a distance from the anus, minimized the danger of ascending infection.

There are reports of 5 cases in which the various modifications of Gersuny's procedure were used with 2 surgical deaths, a mortality of 40 per cent (Table I).



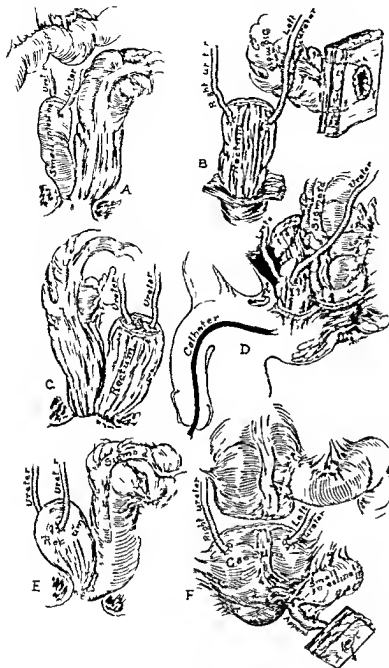


Fig 1 Implantation of the ureters into an artificial bladder formed from a completely excluded portion of the intestinal tract. A Method of Cuneo B Method of Maclaure and Kroenig C Method of Gersuny D Method of Lemoine E Method of Lotheisen F Method of Verhoogen

A. Artificial bladder from small gut. One end is brought out through the anal sphincter the other end is closed and the ureters are implanted into it by the method of Bergenhem

B. Artificial bladder from entire rectum after ileac sigmoidostomy ureters implanted by the direct method.

C. Artificial bladder from entire rectum with the proximal end of the rectosigmoid drawn through the anal sphincter alongside this excluded portion. The ureters are implanted by the method of Maydl.

D. Artificial bladder from entire rectum made to communicate with the urethra for sphincter control. The ureters are implanted by the direct method.

E. Artificial bladder from pouch of anterior rectum. The ureters are implanted obliquely.

F. Artificial bladder from ileocecal region the appendix serving as a urethra. Direct implantation of the ureters is made into the excluded portion of the cecum.

(3) With the excluded rectum made to communicate with the urethra for control by the sphincter Lemoine, in 1913 after performing a cystectomy for carcinoma of the bladder, completely isolated the rectum according to the technique of Heitz-Boyer and Hovelacque, joined it to the posterior urethra which had been left free at the time of the

cystectomy (Fig 1 D), and transplanted the ureters directly. He hoped that this method would result in more satisfactory urinary control, but was unable to determine this because the patient died before the perineal wound healed. Death occurred eighteen days after the operation from renal infection and insufficient lowering of the

sigmoid which allowed the escape of feces into the perineal wound (Table I)

#### C AN ARTIFICIAL BLADDER MADE FROM A POUCH OF ANTERIOR RECTUM

In 1899, Lotheisen devised an operation on cadavers and animals which consisted in transplanting the ureters to a completely excluded pouch made from the anterior rectal wall (Fig 1 E). Through a curved perineal incision he freed the bladder from the rectum and divided the ureters. The anterior rectal wall was grasped as high as possible and drawn down through the anus. Layers of sutures were placed so as completely to isolate this anterior pouch from the posterior rectal canal which still served for the conduction of feces. The ureters were implanted in the fundus of the newly created bladder in an oblique course. Lotheisen considered this operation to be simpler, less dangerous, and more satisfactory than Gersuny's operation. It has not been performed clinically.

#### D AN ARTIFICIAL BLADDER MADE FROM THE ILEOCECAL REGION, THE APPENDIX SERVING AS A URETHRA

In 1908, Verhoogen devised an operation which consisted of complete isolation of the ileocecal region and utilization of the appendix as a urethra (Fig 1 F). The ileum was divided proximal to the ileocecal valve and anastomosed to the hepatic flexure of the colon just distal to the point of division of this structure. Both ureters were implanted separately into the cecum. The appendix was brought out through the skin in the right inguinal region so that the new bladder could be catheterized and irrigated periodically. Verhoogen performed the operation in 2 cases of carcinoma of the bladder, both of which terminated fatally.

The first successful operation by this principle was performed by Makkas in 1910. Makkas divided the procedure into 2 stages, executed one month apart, and modified the technique in 2 ways. In the first stage he formed an artificial bladder by the method of Verhoogen, but performed a side to side anastomosis of the ileum to the midportion of the transverse colon rather than to the ascending colon. At the second operation, instead of implanting the ureters separately, he transplanted the entire trigone to the posterior wall of the newly formed bladder.

Tadder, in 1910, developed an operation on cadavers which was similar to Verhoogen's operation except that the ureters were transplanted, extraperitoneally, by the Berghem procedure to the excluded cecum. In 1912, he reported experimen-

tal work on dogs by a similar technique. Although the majority of the animals died of peritonitis following the exclusion operation, a few survived long enough for him to implant the right ureter into the new bladder.

Langemann, in 1912, further modified the Verhoogen-Makkas technique by isolating 30 cm of ileum with the cecum into which he implanted the trigone extraperitoneally at a second operation. He claimed that the ileocecal cap and the peristalsis of the length of ileum offered a good defense against damming up and temporary infection of the urine, and that the end of the 30 cm of ileum was so movable as readily to permit implantation of the left ureter without stretching or jeopardizing the blood supply.

In 12 cases in which this type of procedure was used there were 8 operative deaths, a mortality of 66 per cent. An additional patient succumbed following exclusion of the cecum prior to ureteral transplantation (Table I).

#### CLINICAL SUMMARY

In the literature are found the reports of 30 patients operated on by 5 different methods of forming an artificial bladder, with 15 deaths, a surgical mortality of 50 per cent. The indication for operation was eversion of the bladder or vesicovaginal fistula in 16 and malignancy of the bladder or uterus in 14. Seven patients of the first group and 8 of the second died as a result of the operation.

#### DISCUSSION

There seems to be no justification either in theory or practice for the formation of an artificial bladder preliminary to ureteral implantation.

#### 2 IMPLANTATION OF THE URETERS INTO A PARTIALLY EXCLUDED PORTION OF THE INTESTINAL TRACT

##### A A BLIND POUCH OF THE LOWER ILEUM EMPTYING INTO THE ILEUM, CECUM, TRANSVERSE COLON, OR SIGMOID

(1) *The ileum*—The first operations based on the principle of partial exclusion of a portion of the intestinal tract were carried out on dogs by Nagano in 1901 and 1902. Nagano divided the lower ileum and, allowing 12 cm to form a blind pocket, reconstructed the small gut by side-to-side anastomosis. He then implanted the ureters by the Maydl method to the mid portion or upper portion of the partially excluded loop. Of 6 animals, none survived longer than eight days. Five died of peritonitis.

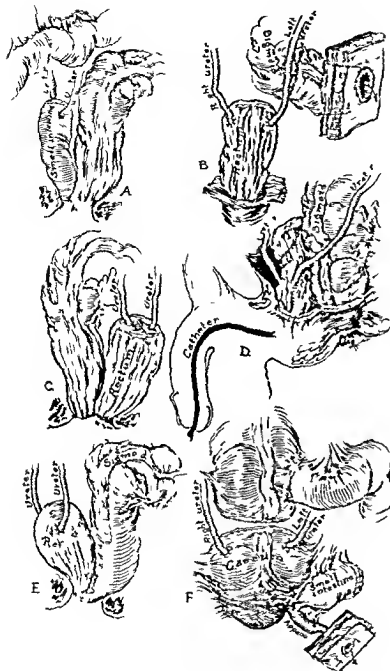


Fig 1 Implantation of the ureters into an artificial bladder formed from a completely excluded portion of the intestinal tract. A Method of Cuneo B Method of Manclaire and Kroenig C Method of Gersuny D Method of Lemoine E Method of Lothensen F Method of Verhoogen.

A. Artificial bladder from small gut. One end is brought out through the anal sphincter the other end is closed and the ureters are implanted into it by the method of Bergenhem.

B. Artificial bladder from entire rectum after ileocectomy ureters implanted by the direct method.

C. Artificial bladder from entire rectum with the proximal end of the rectosigmoid drawn through the anal sphincter alongside the excluded portion. The ureters are implanted by the method of Mandl.

D. Artificial bladder from entire rectum made to communicate with the urethra for sphincter control. The ureters are implanted by the direct method.

E. Artificial bladder from pouch of anterior rectum. The ureters are implanted obliquely.

F. Artificial bladder from ileocecal region, the appendix serving as a urethra. Direct implantation of the ureters is made into the excluded portion of the cecum.

(3) With the excluded rectum made to communicate with the urethra for control by the sphincter Lemoine in 1913 after performing a cystectomy for carcinoma of the bladder completely isolated the rectum according to the technique of Heitz Boyer and Horelague joined it to the posterior urethra which had been left free at the time of the

cystectomy (Fig 1 D), and transplanted the ureters directly. He hoped that this method would result in more satisfactory urinary control but was unable to determine this because the patient died before the perineal wound healed. Death occurred eighteen days after the operation from renal infection and insufficient lowering of the

TABLE I—ANALYSIS OF CASES OF IMPLANTATION OF THE URETERS INTO A COMPLETELY EXCLUDED PORTION OF THE INTESTINAL TRACT—Continued

Classification	Method of bowel exclusion	Type of ureteral transplant	No of operations	Diagnosis	Date	Operator	Complications	Result			Reported by
								Well	Surgical death	Late death	
	Lengemann	Maydl	2	Exstrophy of bladder	1913	Machal	Urinary fistula	1 year			Frund 1916
	Makkas	Maydl	2	Exstrophy of bladder	1910	Makkas	Renal infection calculi in cecum	4 years			Makkas 1910 Frund 1916
	Lengemann	Maydl	2	Exstrophy of bladder	1913	Machal	Urinary fistula	Recovered from operation			Frund 1916
	Case preparatory to ureteral transplant										
	Makkas	None	1	Exstrophy of bladder	1912	Makkas			Peritonitis 4 days		Frund 1916
d (Cont)	Makkas	Maydl		Carcinoma of bladder		DeGraewe			Died		DeGraewe 1908 (cited by Zeiss 1909)
	Makkas	Maydl		Carcinoma of bladder	1908	DeGraewe			2 days		DeGraewe 1908 (cited by Zeiss 1909)
	Lengemann	Maydl	2	Carcinoma of bladder	1913	Lengemann		Recovered from operation			Lengemann 1913
	Makkas	Maydl	3	Carcinoma of bladder	1911	Robritius			2 days		Scheele 1913
	Makkas	Maydl	1	Carcinoma of bladder		Lengemann			Uremia 4 days		Lengemann 1909
	Verhoogen		1	Carcinoma of bladder	1908	Verhoogen			Renal obstruction		Verhoogen 1908
	Verhoogen		1	Carcinoma of bladder	1908	Verhoogen			Renal obstruction		Verhoogen 1908

## SUMMARY

Method of operation	Exstrophy			Malignancy			Total		
	Cases	Deaths	Mortality per cent	Cases	Deaths	Mortality per cent	Cases	Deaths	Mortality per cent
a(2)	3	1	33½				3	1	33½
b(1)	2	1	50	6	1	17	8	2	25
b(2)	5	2	40				5	2	40
b(3)				1	1	100	1	1	100
d	6	3	50	7	6	86	13	9	69.2
Total	16	7	44	14	8	57	30	16	50

(2) *The cecum* Goldenberg, in 1904, devised and practiced a partial exclusion of the ileum in a dog. The ileum was divided a short distance from the cecum and the proximal end reimplanted just above the valves of Bauhin. The distal end was then brought out through a skin incision and the ureters were implanted after the method of Maydl. The resulting defect was to be closed in a subsequent plastic operation, but the latter was never carried out because the dog died of evisceration on the fourth postoperative day.

A clinical operation of this type was performed by Blair in 1916. In the first stage the ileum was divided 10 in. above the cecum, the divided end of the distal segment closed by suture, and the proximal end anastomosed to the ascending colon. Three months later the trigone was implanted into the lateral wall of the blind loop of ileum.

The patient was well one year later, but succumbed to uremia fifteen months after the operation (Table II).

TABLE II—ANALYSIS OF CASES OF IMPLANTATION OF THE URETERS INTO A PARTIALLY EXCLUDED PORTION OF THE INTESTINAL TRACT

Classification	Method of bowel exclusion	Type of ureteral transplant	No. of operations	Diagnosis	Date	Operator	Complications	Result			Reported by
								Well	Surgical death	Late death	
a(1)	Experimental										
a(2)	Blair	Maydl	2	Exstrophy of bladder		Blair				Uremia 15 months	Blair 1906
a(3)	Moskowitz	Maydl	2	Exstrophy of bladder		Moskowitz		Recovered from operation			Moskowitz 1909
	Spannaus	Extraperitoneal	2	Carcinoma of bladder					Renal obstruction 7 days		Spannaus 1911
	Spannaus	Extraperitoneal	2	Carcinoma of bladder			Urinary fistula			6 weeks	Spannaus 1911
a(4)	Berg	Maydl	2	Exstrophy of bladder		Berg			Shock		Berg 1907
	Berg	Maydl	2	Exstrophy of bladder		Berg			Shock		Berg 1907
	Berg	Maydl	2	Exstrophy of bladder		Berg				2 months	Berg 1907
	Berg	Maydl	2	Exstrophy of bladder		Berg		Recovered from operation			Berg 1907
	Berg	Maydl	2	Carcinoma of bladder		Berg		Recovered from operation			Berg 1907
	Borelius Berglund	Maydl	1	Exstrophy of bladder	1903	Borelius		Recovered from operation			Borelius 1903
b	Borelius Berglund	Maydl	1	Exstrophy of bladder	1903	Borelius				Renal infection 3 months	Borelius 1903
	Borelius Berglund	Maydl	1	Exstrophy of bladder	1903					Pneumonia 16 years	Lindstrom 1911
	Borelius Berglund	Maydl	1	Carcinoma of bladder	1906	Loewe			Shock		Loewe 1911
	Von Misch	Direct	1		1903	Von Misch		12 months			Von Misch 1907
	Borelius Berglund		1						Renal infection		Elsberg 1913
c(1)	Mueller	Maydl	1	Exstrophy of bladder		Floercken		5 years			Floercken 1912
	Dowden	Maydl		Exstrophy of bladder		Dowden	Renal infection	3 months			Dowden 1909
c(2)	Muscatello	Maydl and direct	1	Exstrophy of bladder	1904	Muscatello		3 months			Muscatello 1905
	Muscatello	Maydl	2	Exstrophy of bladder		Moorhead			Pneumonia pulmonary embolus		Moorhead and Moorhead, 1906
d	Experimental										

(3) *The transverse colon* Moskowitz, in 1909, described a method whereby the ileum was divided and the proximal end anastomosed to the transverse colon. The ureters were implanted in the distal lumen of the ileum by Maydl's method.

Spannaus, in 1911, modified Moskowitz's operation by extraperitonealizing the ureteral transplant.

In 3 clinical cases, 1 surgical and 1 late death occurred (Table II).

(4) *The sigmoid* Berg in 1907, isolated a loop of small gut and diverted one end of it into the sigmoid (Fig. 2, A and A'). At a subsequent operation he implanted the trigone extraperitoneally into the side of the excluded loop. Of 5 patients, 2 recovered (Table II).

TABLE II—SUMMARY

Method of operation	Exstrophy			Malignancy			Total		
	Cases	Deaths	Mortality per cent	Cases	Deaths	Mortality per cent	Cases	Deaths	Mortality per cent
a(1)	1	1	100				1	1	100
a(3)	1			2	1	50	3	1	33½
a(4)	4	2	50	2			5	2	40
b	3	1	33½	1	1	100	4	2	50
b (No diagnosis)	2	1	50				2	1	50
c(1)	2						2		
c(2)	2	1	50				2	1	50
Total	15	6	40	4	2	50	19	10	42

#### B A BLIND POUCH OF SHORT-CIRCUITED LOOP OF THE SIGMOID

Borelius, in 1903, acting upon a suggestion made by his assistant, Berglund, devised a method of partially excluding a loop of sigmoid by a side-to-side anastomosis at its base (Fig 2 B). The ureters were anastomosed to the dome of the loop by the Maydl procedure.

Misch, in 1907, modified the Borelius-Berglund operation by placing a ligature above the site of the ureteral implantation in the loop of short-circuited sigmoid. His intention was to prevent the reflux of fecal matter to the region of the ureteral orifices.

In a group of 6 cases in which these methods were used there were 3 surgical deaths (Table II).

#### C A BLIND POUCH OF THE SIGMOID EMPTYING INTO THE LOWER SIGMOID OR THE RECTUM

(1) *The lower sigmoid* Mueller, in 1903, further modifying the Borelius-Berglund procedure, completely divided the sigmoid, making a blind pouch for the implantation of the trigone (Fig 2 C). He made a side to-side anastomosis between the proximal end of the divided sigmoid and the lower sigmoid, and implanted the trigone in the distal end. He claimed that this step further insured against the passage of fecal matter into the implanted section and made the anastomosis easier by bringing its intended site nearer the base of the bladder.

Dowden, in 1908, described a technique which was similar except that the sigmoid was re united by side to side anastomosis.

Two patients operated on by this means lived (Table II).

(2) *The rectum* Muscatello, in 1904, devised an exclusion operation in which the sigmoid was divided, the proximal end re implanted by a side

to-side anastomosis to the rectum, and the trigone sutured into the distal divided end of the sigmoid.

Werchus, in 1911, reported a method which was similar except that the trigone was implanted in the side, rather than in the end, of the blind sigmoidal pouch.

In 2 clinical cases in which Muscatello's method was used the surgical mortality was 50 per cent (Table II).

#### D A BLIND POUCH OF THE UPPER RECTUM

Utilizing the upper rectum to form a blind pouch, Descomps, in 1909, performed an operation on the cadaver in which he sectioned the upper rectum, closed the inferior end, and made a terminolateral implantation of the superior end to the anterior surface of the rectum low down (Fig 2 D). The ureters were implanted in the superior portion of the excluded rectum by the principle of mucosa to mucosa, and the entire site was extraperitonealized. No clinical cases have been reported.

#### CLINICAL SUMMARY

The surgical principle of the formation of a blind pouch of the intestine into which to implant the ureters has been applied in 17 cases with 7 operative deaths, a surgical mortality of 41 per cent. The reports of these operations are analyzed in Table II.

#### DISCUSSION

The theoretical basis for such operations is unsound, a conclusion which is fully supported by the poor results following the few attempts which have been made to apply it. Rather than serving to protect the ureteral orifices from the fecal current, the blind pockets apparently act as traps for fecal matter and stasis of urine, thereby contributing to the very danger the surgeon seeks to avoid.

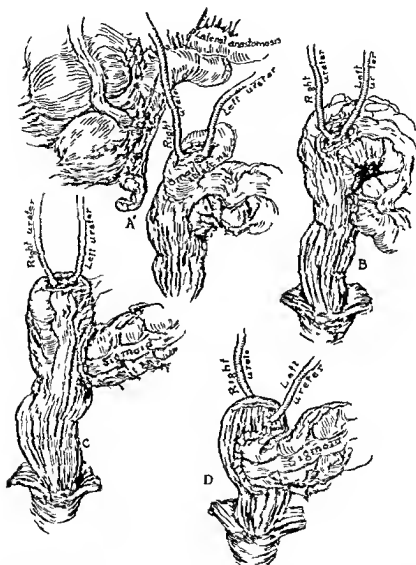


Fig. 2 Implantation of ureters into a partially excluded portion of the intestinal tract A Method of Berg B Method of Borelius and Berglund C Method of Mueller D Method of Descomps

A Lateral anastomosis of ileum at the point where portion was resected

B Excluded loop made from a portion of the lower ileum The trigone has been implanted in the blind pouch

C A loop of sigmoid has been short-circuited as shown

by the arrow and the trigone has been implanted into the dome of this loop

C The sigmoid has been divided and an end-to-side anastomosis made The trigone has been implanted into the distal blind end of the sigmoid

D The rectosigmoid has been divided and an end-to-side anastomosis of the sigmoid to the mid portion of the rectum made The ureters have been implanted into the blind end of the upper rectum by the direct principle of mucosa to mucosa

## PART II IMPLANTATION OF THE URETERS INTO THE INTACT INTESTINAL TRACT

The different methods of implantation into the intact tract are so numerous and the difference between many of them is so slight that in order to gain any conception of the relation of methods to results it is necessary to group the procedures according to the chief principle of surgery upon which they are based. As a rule, articles in the literature refer to a method by the name of the surgeon who originated it. Some minor modification of an original method, however, frequently has attained the status of a new method under the name of the surgeon proposing it, without proper recognition of the underlying principle which he has borrowed. As a consequence, the same surgical principle, for example the muscularizing and Witzel gastrostomy method of implantation, carries an American name in the United States (Martin, 1899), a French name in France (Depage and Mayer, 1906), a Russian name in Russia (Tichoff, 1905), and an English name in England (Stiles, 1907). Sometimes it is difficult to group together the operations which are similar in principle because of a combination of different principles in the one method of operation.

A surgical principle employed with the idea of preventing and minimizing a possible complication arising from the intestine should be distinguished from one proposed primarily to prevent a ureteral complication. Placing foremost the principles which have been directed against ureteral complications will simplify the classification of the different operations. The preparation of the bowel, extraperitoneal operations, methods of intra-abdominal drainage, the use of various intestinal clamps, and irrigation of the bowel at the time of operation are all procedures which have been adopted at various times because of the risk of peritonitis. A study of the causes of peritonitis<sup>1</sup> will show that this complication usually results from leakage after operation because closure at the site of implantation was imperfect, because one or more sutures perforated the bowel or ureter, because one or more sutures tore out at the site of implant, or because a local necrosis of the bowel or ureter occurred by reason of interference with the blood supply. Peritonitis seldom, if ever, results entirely from contamination at the time of operation. Therefore only those principles of surgery which are directed against the occurrence of

leakage after implantation need be considered. The methods which have been referred to previously and which are intended primarily to prevent contamination are of secondary importance, although they cannot be overlooked. The preparation of the bowel by the use of a non-residue diet and enemas beforehand is the only practical and essential procedure. The methods which are used to prevent postoperative leakage at the site of implantation are related closely to the surgical principles directed against the occurrence of ureteral complications (obstruction-infection). It is a question, for instance, whether submucosal implantation should be regarded in principle as a surgical imitation of the ureterovesical valve, as was proposed by Coffey, or as a simple and sound way to prevent leakage as well as the only natural route for the entrance of the ureter into the bowel.

With these limitations and exceptions, 11 surgical principles of uretero-intestinal implantation can be recognized. In order to give their full historical value they will be discussed in the order in which they have been proposed, and insofar as is possible the originator of the principle will be indicated. Some of the original contributions are purely experimental and the idea has been applied later clinically by another surgeon, often in a modified form. An attempt has been made to distinguish between the experimental and the clinical and to indicate the major modifications of each original principle.

We recognize the possibility of error in our interpretation of originality. The literature available to us is incomplete. The main purpose of this study, however, is not historical.

The 11 surgical principles which have been applied to uretero-intestinal implantation may be classified chronologically as follows:

- 1 The formation of a fistulous tract (1851)
- 2 The direct anastomosis of ureter and bowel (1878)
- 3 The muscularizing principle
  - (a) To prevent leakage (1886)
  - (b) Stripping action (1890)
- 4 The preservation of the ureterovesical orifice (1892)
- 5 Temporary diversion of urine until healing has occurred (1892)
- 6 The use of a flap to act as a valve (1895)
- 7 The use of mechanical devices (1895)
- 8 Implantation into structures which open normally into the gastro-intestinal tract (1900)

<sup>1</sup>Hinman F. et al. An experimental study of uretero-intestinal implantation. I. The cause of peritonitis. Surg. Gynec. & Obst. 1936 62: 909-917.



9 The submucosal principle, valve action (1910)

10 Temporary colostomy (1915)

11 The use of the intact ureter (1931)

These surgical principles will be discussed, and the operative cases which have been reported will be analyzed, in this chronological order

#### FIRST SURGICAL PRINCIPLE—FORMATION OF A FISTULOUS TRACT BETWEEN THE URETER AND BOWEL

The formation of a fistulous tract between the ureter and the bowel was accomplished

a In cases of exstrophy, by a long suture connecting the lumen of the ureter to the lumen of the bowel Simon July 1851, Lloyd, October, 1851

b By a submucosal tunnel in the intestinal wall Kirwin 1930 experimental

c By the transfixion suture

1 With submucosal implantation Ninth surgical principle Coffey No 3, 1930

2 With the intact ureter Eleventh surgical principle Higgins 1933

3 With temporary drainage by ureterosomy Fifth surgical principle Hunman, 1935

d By perforation of apposing surfaces with the cautery in conjunction with the use of the intact ureter Eleventh surgical principle Ferguson 1931 experimental Poth, 1935 experimental

e By electric coagulation of apposing surfaces without perforation Wadhams and Carabba 1935, experimental

f By the transfixion hairpin method in conjunction with the intact ureter Eleventh surgical principle Brenizer, 1935

#### A FORMING A LONG FISTULOUS TRACT BY THE USE OF A SUTURE (SIMON)

The earliest attempt to divert the urine from the ureter to the large bowel was made by establishing a long fistulous tract between these structures On July 5, 1851 in a case of exstrophy of the urinary bladder, Sir John Simon passed 2 sutures through each ureter into the rectum (Fig 3 A) The rectal ends were united on either side and fistulas were produced by pressure necrosis brought about by the application of continual traction to the ureteral ends of the sutures (Fig 3 B) Although the patient passed large quantities of urine by rectum within a period of three weeks, all attempts at closure of the ureterovesical orifices failed and death ensued from pelvic peritonitis and 'kidney and ureteral disease' at the end of twelve months At necropsy both ureters

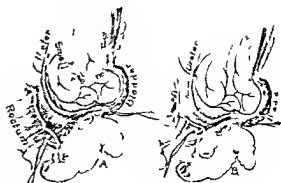


Fig. 3 First principle Simon's method of forming a long fistulous tract between ureter and bowel. A. Two parallel sutures passing from ureter into rectum. B. Rectal ends of sutures tied traction applied to vesical ends. (After Pousson.)

were found to be blocked by calculi although the fistulas were still patent.

In October of the same year, Lloyd employed this principle in performing an operation upon another patient suffering from exstrophy At the end of seven days death resulted from generalized peritonitis caused by perforation of the peritoneal cavity by the ureterorectal transfixion sutures

The failure of these initial operations branded the principle of the formation of a long fistulous tract as dangerous and impractical, and it was not until seventy nine years later that the principle was revived in modified forms

#### B BY THE SUBMUCOSAL TUNNEL IN THE INTESTINAL WALL

In 1930 Kirwin described an experimental method by which a fistulous tract was formed in the wall of the intestine between the submucosa and muscularis with the idea of minimizing ascending infection by the formation of a valve and separating the end of the ureter from the fecal current A ureteral catheter led from the end of the ureter and was transplanted intramurally through the artificial canal in the wall of the bowel and out to the rectum for the drainage of urine until the new canal could be used As a measure intended to prevent stenosis a silk buttonhole suture was whipped around the orifice in the submucosa.

#### C BY THE TRANSFIXION SUTURE

(1) *Ninth submucosal implantation* Coffey also in 1930 with the idea of diminishing sepsis proposed the use of a transfixion suture in conjunction with submucosal implantation (Fig 4) The

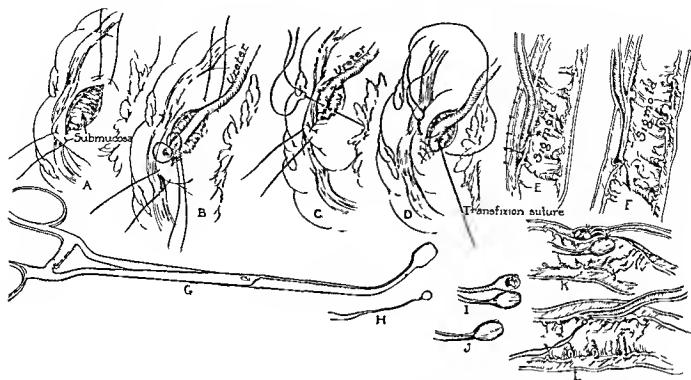


Fig 4 First and ninth principles Forming a fistulous opening between the submucosally implanted ureter and the lumen of the bowel by a transfixion suture (Coffey's technique No 3) A, Incision in the sigmoid down to the submucosa B, The end of the ureter transfixed and ligated with a suture anchoring it between the submucosa and muscularis at the lower angle of the incision in the bowel C, Transfixion suture passing through the lumen of the ureter and the lumen of the bowel D, Suture of the muscularis and serosa over the submucosal course of the ureter E, Sectional view of the transfixion operation

The star shows the transfixion suture F, The final result showing the fistula from the ureter into the bowel Figures G to L illustrate the modification with the use of the metal ring G, Special rectal forceps for introducing the metal ring H, Metal ring with linen thread attached I, Forceps open, about to grasp the metal ring and attached thread J, Forceps grasping the metal ring K, Transfixion suture passed through the metal ring held in place by forceps L, Forceps removed transfixion suture tied through the metal ring bearing the thread which passes out the anus (After Coffey)

uretero-intestinal orifices are formed by the sloughing through of sutures which transfix the lumina of the ureters to those of the bowel As the urinary stream is blocked until this occurs, the ureters must be implanted in 2 stages, 1 at a time

Acting upon a suggestion made by Walker-Taylor, Coffey, in 1932, modified the operation by placing in the rectum a metal ring to which the transfixion suture is anchored (Fig 4 H and L) This assures penetration of the intestinal lumen and makes more certain and rapid a cutting through of the suture by means of traction on a string tied to the ring and leading through the anus This modification was devised especially to prevent failure in the establishment of fistulas when the ureters are thickened, as had happened

Reports of cases treated by the submucosal method with the transfixion suture (Coffey technique No 3) have been too few to permit worthwhile conclusions concerning the clinical results

following this procedure In 8 cases, 5 of exstrophy and 3 in which the diagnosis was not stated there were no deaths In 3 cases of malignancy there were 2 surgical deaths, one from pneumonia and the other from urinary infection The third patient survived the operation, but died eight months later from the recurrence of a carcinoma of the cervix

(2) *With the intact ureter* Higgins (1933) also utilized Coffey's transfixion suture, devising a 2-stage operation which deferred diversion of the urinary stream from its normal course into the bladder until after the fistulous tracts were established This operation is described under the eleventh surgical principle, the use of the intact ureter

(3) *With drainage by ureterostomy* In order to make possible a bilateral 1-stage operation by the submucosal method with a transfixion suture, Hinman, in 1933, proposed an extraperitoneal ureterostomy for the purpose of draining the urine by extraperitoneal catheter (see Fifth Surgical

Principle) until such time as the suture cut through to establish a new orifice

**D BY PERFORATION OF APPOSING SURFACES WITH A CAUTERY**

This method has been used experimentally by *Ferguson and Poth* in conjunction with the surgical principle of the intact ureter and will be discussed in that connection

**E BY COAGULATION WITHOUT PERFORATION OF THE APPOSING SURFACES**

A method of forming a fistula between the ureter and bowel other than by a transfixion suture or perforation has been suggested by *Wadhams and Carabba* (1935). In a dog these writers obtained an apparently satisfactory communication by electric coagulation of small apposing areas of the intestinal submucosa and ureteral wall. Following coagulation of the surfaces to be

placed in apposition, the ureter is implanted submucosally so that the coagulated surfaces are apposed, and the latter are held in place by sutures which do not penetrate either the lumen of the ureter or that of the rectum. In the experiment reported by *Wadhams and Carabba* the operation was performed in 2 stages, the right ureter being implanted one week after the left. At the second operation the left kidney was found to be dilated, but had almost returned to the normal size when the animal was sacrificed two weeks after the second implantation. At this time however, the right kidney was dilated and pus was present in the contained urine.

**F BY LOOP AND TRANSFIXION WIRES IN CONNECTION WITH THE USE OF THE INTACT URETER**

This technique for the formation of a fistulous tract is discussed in connection with the eleventh principle

**TABLE III—THE FORMATION OF A FISTULOUS TRACT BETWEEN THE URETER AND THE BOWEL—FIRST SURGICAL PRINCIPLE**

a By suture from ureter to rectum (Simon)  
 c 1 By transfixion suture in embedded ureter—unilateral 2 stage (Coffey No. 3)  
 c 3 By transfixion suture with extraperitoneal ureterostomy drainage by ureteral catheter—bilateral 1 stage (Hinman)

Condition	I Congenital anomalies and trauma			II Vesical infection (ulcer)			III Mal gnancy			IV Not stated			Total			Summary
	a	c 1	c 3	a	c 1	c 3	a	c 1	c 3	a	c 1	c 3	a	c 1	c 3	
Number of cases	2	5				2		2			3		3	11	1	16
Deaths																
Surgical	S	1						2	1				1	3	1	4
Late	L	1						1	1				2	1	1	3
Causes																
Shock	S															
L	L															
Pneumonia	S							1						1		
L	L															
Urinary infections	S							1	0 5					2	0 5	
L	L															
Urinary obstruction	S							0 5							0 5	
L	L	1											1			
Peritonitis	S	1											1			
L	L															
Bowel obstruction	S															
L	L															
Recurrence								(5 mos later)	1					1	1	
Not stated	S															
L	L															
Total deaths	2							3	2				5	3	1	7

## SUMMARY OF CASES

The 16 operations which have been reported as having been performed by the methods listed under a, c 1, and c 3 are analyzed in Table III (2 by Method a, 11 by Method c 1, Coffey No. 3, and 3 by Method c 3). The operative mortality was 25 per cent.

## DISCUSSION

Simon's method of forming a long fistulous tract is unsurgical. In extrophy of the urinary bladder, the only condition suitable for the employment of this technique, the peritoneum extends extremely low, almost reaching to the anus. Therefore, the likelihood of perforating the peritoneum is very great. Even granting that one might avoid the peritoneum, there still remains the apparently insurmountable difficulty of closing off the ureteral orifices. Furthermore, no provision is made for epithelialization of the long fistulous tract. Without an epithelial lining, urinary extravasation, the spread of infection into the surrounding tissues, or ultimate constriction or closure of the sinus is inevitable.

Kirwin recognized the deficiency of his method of forming a fistulous submucosal tunnel in the intestinal wall when, in 1934, he stated that the operation was unsatisfactory because the artificial canal failed to epithelialize and eventually there was formed at the site of implantation a stricture which favored, rather than retarded, ascending infection.

Coffey's technique No. 3, utilizing a transfixion suture in conjunction with the submucosal principle, has the advantage of not requiring an open incision into the bowel. It has, however, these disadvantages: 1. The transfixion suture contaminates the operative field. 2. The ureter is obstructed until a fistulous tract is formed. 3. The fistulous orifice which is formed when the suture finally sloughs through is a lateral slit in the ureteral wall, an opening never so permanently patent as an orifice at the end.

The last disadvantage would seem to be the chief drawback to the formation of a uretero-intestinal orifice by electric perforation or coagulation. Either method produces a side opening in the ureter which tends to become constricted because of the very nature of a longitudinal opening in the wall of a muscular channel.

The one advantage of the electric coagulation method of Wadham's and Carabba is asepsis. Unfortunately, the procedure entails the technical difficulty of producing uniformly that degree of coagulation which will assure the development of a satisfactory fistula without perforation into the peritoneal cavity. Temporary interruption of the

urinary stream is a further disadvantage, and there is also the possibility that a fistula may fail to develop on account of insufficient coagulation.

## SECOND SURGICAL PRINCIPLE—DIRECT ANASTOMOSIS OF THE URETER AND BOWEL

- a. Direct anastomosis of mucosa to mucosa
  1. Using the end of the ureter (end to side) Smith, 1878, Chaput, 1892
  2. Suturing a slit in the side of the ureter to a slit in the side of the bowel Peterson, 1900, experimental
- b. Axial implantation of the ureter without the suture of mucosa to mucosa

## A. DIRECT ANASTOMOSIS OF MUCOSA TO MUCOSA

1. *Using the end of the ureter.* The first transplantation of the ureters into the bowel in man was carried out by T. Smith in 1878. The method, original with Smith but generally attributed to Chaput (1892), consists of direct axial transplantation of the end of the ureter into an opening made through all coats of the intestine (Fig. 5). The mucosa of the ureter is sutured to the mucosa of the bowel and another line of sutures closes the muscular and serous layers of the bowel around the ureter.

2. *Suturing a slit in the side of the ureter to a slit in the side of the bowel.* Although Boari in 1895 devised a lateral anastomosis with his mechanical button, it was not until 1900 that Peterson described a lateral anastomosis of the ureter to the bowel by means of suture (Fig. 6). Employing a technique similar to the end-to-side operation, he united a slit in the side of the ureter to an opening in the intestine in dogs. His attempt, by this



Fig. 5. Second principle. Direct anastomosis of the end of the ureter to the side of the bowel with suturing of mucosa to mucosa by the method of Smith and Chaput. A, The ureter is brought to the site elected for implantation into the bowel. B, An opening is made into the lumen of the bowel and sutures are laid which will unite mucosa to mucosa. C, The anastomosis is completed interrupted sutures closing the muscular and serous layers of the bowel around the ureter (étageant). (After Papin.)

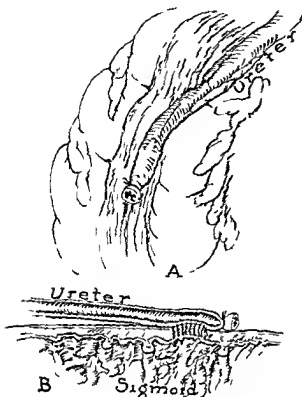


Fig 6 Second principle Peterson's side-to-side anastomosis of the ureter to the bowel by suture of mucosa to mucosa. A The course of the ureter over the sigmoid showing the opening (in outline) which will be made between the two structures. B Sectional view of the sutures joining mucosa to mucosa.

method to prevent dilatation of the ureters and ascending infection met with no success. The operation has not been performed clinically.

#### B AXIAL IMPLANTATION OF THE URETER WITHOUT SUTURE OF MUCOSA TO MUCOSA

Glueck and Zeller in 1881 in the first experimental work on dogs used an axial method with out suture of mucosa to mucosa. In 1898, Frank sutured the ureters side by side into a single rectal incision by the direct method. He introduced the use of an anchoring suture to fix the end of the ureter. However his suture penetrated only the mucosa and muscularis being closed over by serosa instead of perforating it as in the anchoring suture of some of the later methods. This technique was designed to prevent leakage of the bowel contents along the suture into the peritoneal cavity.

Beaver and Mann, in 1932, after attempting various techniques in experiments on dogs, re-

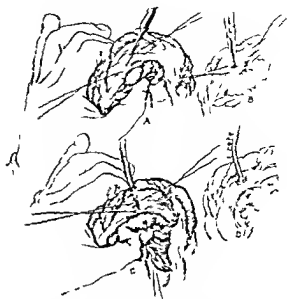


Fig 7 Second principle Direct implantation of the ureter into the bowel by the method of Beaver and Mann without suture of mucosa to mucosa. A Stab wound being made through all layers of the sigmoid between two ureters. B Enlarging the opening with a clamp. C An anchoring suture after transfixing either side of the end of the ureter. D The end of the ureter is drawn into the lumen of the bowel and fixed in place by tying the anchoring suture. The incision in the sigmoid is repaired around the ureter. (After Beaver and Mann.)

ported that the best results were obtained from a simple direct implant (Fig 7).

#### SUMMARY OF CASES

In 37 cases in which axial transplantation was done there were 16 deaths in the hospital, a surgical mortality of 43 per cent (Table IV). In 11 cases of congenital malformations there were only 4 deaths while in 15 cases of malignancy there were 11 deaths. There was no particular preponderance of any one cause of death. Renal infection followed the operation in 8 cases (21.6 per cent), urinary obstruction and the formation of a fistula each in 5 cases (13.5 per cent), and peritonitis, intestinal obstruction and infection of the wound each in 2 cases (5.4 per cent).

#### DISCUSSION

The disadvantages of the direct method of implantation are obvious. Accurate approximation of mucosa to mucosa is difficult and cannot be done without gross contamination from the intestinal tract. Considerable edema results from the sutures causing a more or less temporary inter-

TABLE IV—DIRECT ANASTOMOSIS OF THE URETER AND BOWEL END-TO-SIDE (SMITH, CHAPUT) SECOND SURGICAL PRINCIPLE

Condition	I Congenital anomalies and trauma	II Vesical infection (ulcer)	III Malignancy	IV Not stated	Total
Number of cases	17	3	15	2	37
Deaths					
Surgical S	3	2	9	2	16
Late L	1	1	2		4
Causes					
Shock S			2		
L					
Pneumonia S			1		
L					
Urinary infections S	1		15	1	
L			15		
Urinary obstruction S		2	1		
L	1	1			
Peritonitis S	1		15		
L					
Bowel obstruction S	1				
L			05		
Not stated S			1	1	
L			1		
Total deaths	4	3	11	2	20

ruption of the urinary stream. Later, with healing, the infection which is inevitably present produces stenosis of the orifice and urinary obstruction. The gravest danger, however, is that of peritonitis from postoperative leakage at the site of implantation because of the short, direct course of the ureter through the wall of the intestine without provision for sealing off by some form of overlapping.

The frequently raised objection to the direct method, that the absence of a valve-like mechanism favors reflux of fecal contents directly up the ureter, does not seem logical. The advantage of an oblique insertion may lie rather in diminution of the danger of leakage around the ureter than in the prevention, by valvular action, of reflux up the lumen. The good results achieved in the experiments of Beaver and Mann would tend to disprove the need for a valve. The lip of the orifice of a normal ureter is mucosal, devoid of muscle, and in consequence acts as a valve. The uretero-intestinal orifice of a transplanted ureter retains the muscular coats of the ureter and does not have the same valvular action as the ureterovesical entrance, regardless of an oblique insertion.

Peterson's lateral anastomosis is subject to all of the objections just mentioned as well as to the drawbacks of an orifice on the side which were taken up in the discussion of the first surgical principle.

### THIRD SURGICAL PRINCIPLE—MUSCULARIZING PRINCIPLE

- Overlapping of the intestinal wall to form a muscular canal around the ureter (as around Witzel's gastrostomy tube, 1891). Bardenheuer, experimental, 1886, clinical, 1887, Depage and Mayer, 1904, Tichoff, 1905, Stiles, 1907.
  - A muscular canal around the ureter beneath the serosa (stripping action). Martin, 1899.
  - With preservation of the ureteral orifice.
- Fourth surgical principle. Jefferson, 1908.

#### A. OVERLAPPING OF INTESTINAL WALL

One of the most favored principles employed in uretero-intestinal anastomosis has been implantation of the ureter in a canal made by overlapping the bowel wall, similar to the method carried out by Witzel in 1891 in his classical operation for forming a canal of stomach wall around a gastrostomy tube.

Bardenheuer was the first to utilize the principle in ureteral surgery when, in 1886, he implanted single ureters extraperitoneally in 5 dogs. Two of the dogs died of an unknown cause, 2 showed stenosis at the site of the transplantation when they were sacrificed after four weeks, and 1 had a pyonephrosis when killed at the end of a year. In 1887, before performing the first cystectomy in man, Bardenheuer implanted both ureters into the rectum. The patient died some time later in uremia from bilateral hydronephrosis.

The method used by Bardenheuer was original. The ureter was tied over a curved needle which was thrust through the wall into the lumen of the colon and brought out  $\frac{1}{2}$  in below the point of entrance, carrying the ureter in and out with it. The end of the ureter which presented at the lower perforation was then detached from the needle and allowed to slip back through this perforation into the lumen of the gut, the opening then being closed by a suture. The bowel was invaginated at the site of the entrance of the ureter so as to form a muscular channel about the ureter.

In 1892, Morestin, using 6 dogs, implanted the ureter through a buttonhole in the rectum, whipping the intestine over the ureter with a continuous suture. All of the animals died of peritonitis or ascending renal infection.

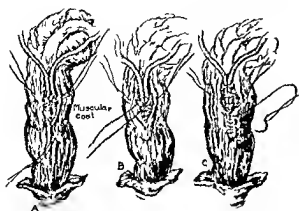


Fig 10 Third principle The formation of a muscular canal around the ureter beneath the serosa by the method of Martin A The ureters are divided and placed side by side on the denuded muscular coat made by an incision through the serosa; an anchoring suture, placed through the ends of both ureters enters the opening made into the bowel lumen in the distal area of the reflected serosa and transfixes the entire wall farther on B The anchoring suture is tied and the ureters are closed over by muscularis with interrupted sutures C Closure of the serosal layer (After Coffey)

TABLE 1 — THE MUSCULARIZING PRINCIPLE (STRIPPING ACTION) THIRD SURGICAL PRINCIPLE

Condition	I Congenital anomalies and trauma	II Vesical infection (ulcer)	III Malignancy	IV Not stated	Total
Number of cases	89	3	44		136
Deaths					
Surgical S	17	1	20		38
Late L	4	1	5		10
Causes					
Shock S			2		
L					
Pneumonia S			2		
L	1				
Urinary infections S	75	1	6		
L	05	1	1		
Urinary obstruction S			1		
L	1				
Peritonitis S	75		7		
L	05		1		
Bowel obstruction S			1		
L					
Not stated S	1		1		
L	2		3		
Total deaths	21	2	35		48

or more layers about the ureter, necrosis of the bowel from interference with the blood supply be cause of the overlapping, perforation of the gut by one or more sutures, and tearing out of the sutures which do not catch the submucosa. Any of these complications might lead to the formation of a fistula and peritonitis.

#### FOURTH SURGICAL PRINCIPLE—PRESERVATION OF THE URETEROVESICAL ORIFICE

- By transplantation of the trigone with both orifices intact Maydl, 1892, Moynihan 1905
- By transplantation of each orifice separately in the form of a rosette Bergenhem, 1894, Jaja, 1901

#### A THE METHOD OF MAYDL

Maydl was the first to apply the principle of preserving the ureterovesical orifice to prevent ascending urinary infection (suggested by Tuffier in 1888). In 1892 he transplanted the base of the inverted bladder into the large bowel by the intraperitoneal route (Fig 11). A small ellipse of trigone bearing the ureters was introduced into a longitudinal incision in the sigmoid and the adjacent mucous membranes of the bladder and intestine were united by interrupted sutures. The anastomosis was completed by a similar line of suture, joining the muscular and serosal coats of the wall of the bowel to the muscular layers of the wall of the bladder.

In 1897 Maydl introduced the use of flaps to reinforce the line of suture. One year later he extraperitonealized the operation in order to prevent contamination of the peritoneal cavity by urine and feces should a fistula develop.

Moynihan, in 1905 implanted the entire extrophied bladder extraperitoneally into the rectum. Coleman and Wilkinson, in 1918, in a further development of Moynihan's modification, sutured off the peritoneum as high above the anastomosis as possible and used the redundant peritoneum to reinforce the suture line. Their aim was to prevent the formation of a hernia.

Peterson, in 1900, and Beck, in 1906, applying the Maydl operation sutured rectangular (instead of elliptical) trigonal flaps into the sigmoid.

#### SUMMARY OF CASES

The principle of preserving the ureteral orifice is limited in application to cases of extrophy or other abnormalities of the bladder in which the trigonal region is not involved in a disease process. Of 243 cases collected from the literature (178, Maydl, 65, Bergenhem), vesical infection was

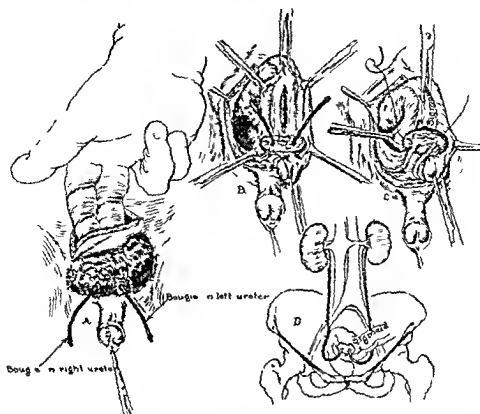


Fig 11 Fourth principle Maydl's intraperitoneal method of implanting the trigone with the ureteral orifices intact into the sigmoid A, Bougies inserted up the ureters, the lines of incision for preserving the ellipse of the vesical mucous membrane surrounding the ureteral orifices and for resecting the remainder of the ectrophied bladder B, Longitudinal incision through all layers of the sigmoid for reception of the freed ellipse of the trigone C, The trigone inserted in the sigmoidal incision and sutured in place D The completed operation (After Katz and Edmonds)

present in only 3 and malignancy in only 4 The diagnosis in 31 was not stated

The results of 178 operations by the Maydl method are analyzed in Table VI Following 178 trigonal implantations there were 55 surgical deaths, a mortality of 31 per cent Ascending urinary infection accounted for the greatest number of deaths, 23, and peritonitis, the next most frequent fatal complication for 9.5 per cent

Renal infection was the predominant complication in 43 (24.2 per cent) of the cases Fistulas occurred in 17 (9.6 per cent)

Peritonitis, which developed in 24 (12.5 per cent), is to be explained by leakage along the line of the anastomosis

#### DISCUSSION

Infection followed by the formation of an abscess and the breaking down of sutures is likely to occur in a long line of sutures which is contaminated when being laid no matter how firm the immediate union This factor constitutes one of

the outstanding defects of the Maydl operation The extraperitoneal modifications, while not reducing the occurrence of fistulas, contribute to the safety of the procedure by preventing peritonitis

Another detrimental feature which is peculiar to the Maydl type of operation is the curved course which the lower parts of the ureters are required to take in order to reach the transposed position of the trigone Unless extreme care is exercised in selecting the proper site for the anastomosis, tension may result in kinking of the ureters with the development of urinary obstruction

Technical difficulty is encountered in carrying out the operation in women because of the presence of the female pelvic organs In some cases the difficulty is so great that hysterectomy must be added to the already extensive operative procedure

#### B THE METHOD OF BERGENHEIM

Although numerous surgeons have assumed credit for originating the method of separate extraperitoneal transplantation of the intact ure-



TABLE VI—PRESERVATION OF THE URETEROVESICAL ORIFICE. FOURTH SURGICAL PRINCIPLE

a Transplanting the trigone with both orifices intact (Maydl)

b Transplanting each orifice separately in the form of a rosette (Bergenhem)

Condition	I. Congenital anomalies and trauma		II. Vesical infection (ulcer)		III. Malignancy		IV. Not stated		Total		Summary
	a	b	a	b	a	b	a	b	a	b	
Number of cases	150	15	1	2	1	1	15	6	175	65	240
Deaths											
Surgical	S	41	7		1		15	4	55	11	66
Late	L	8	9	1		1	1		9	11	20
Causes											
Shock	S	6	1				1				
L	L										
Peritonitis	S	15					1				
L	L	15	1								
Urinary infections	S	16	1		1		1				
L	L	1	45	1							
Urinary obstruction	S	1						1			
L	L	15	15				1				
Peritonitis	S	15	1				1	1			
L	L										
Bowel obstruction	S	1									
L	L										
Not stated	S	1	1				1	1			
L	L	1	1			1					
Total deaths		10	10	1	1	1	14	4	64	21	85

teral orifices the first authentic report was published by Bergenhem, in 1894 and to him priority is now universally conceded.

Jaja, of Italy, who claims to have antedated Bergenhem by several months, did not publish his article until 1901. His description of the operation is hazy. The method was used in succession by Trendelenburg of Germany (1895), Pozza of Italy (1897), Martin of the United States (1898), Capello of Italy (1898), London of Australia (May 12, 1899) and Peters of Canada (July 5, 1898). London and Peters to each of whom the method has been frequently attributed furthered its popularization.

In this procedure the vesical ends of the ureters are dissected out with a rosette of vesical mucosa about 1 cm in diameter (Fig. 12). Then, with the aid of ureteral catheters, which are removed at the completion of the operation, the ends of the ureters are introduced extraperitoneally into small perforations made in the rectum. The ureters project into the rectal lumen for a short distance, where they may be fixed in place with sutures to the rectal mucosa (Bergenhem, Pozza) or anal skin (Buchanan) or by forceps

(London). However, some surgeons depend upon the nubbin of vesical mucosa to prevent escape of the ureters and allow the ends to hang free (Trendelenburg, Peters).

The use of ureteral retention catheters following the Bergenhem operation was recommended first by Peters and later by Hugnier (1910) and Feutrie (1911).

Helferich (1900) combined the procedures of Maydl and Bergenhem by intraperitoneally transplanting the separated ureters with orifices intact, into a single rectal incision. Jacobson (1903) in a similar combination of methods, used the extraperitoneal route.

#### SUMMARY OF CASES

The results of the Bergenhem procedure are analyzed in Table VI with those of Maydl's operation. In 65 cases in which the Bergenhem procedure was followed there were 11 surgical deaths a mortality of 17 per cent.

#### DISCUSSION

In this operation, as well as in Maydl's operation, the factor of leakage at the site of the anas-

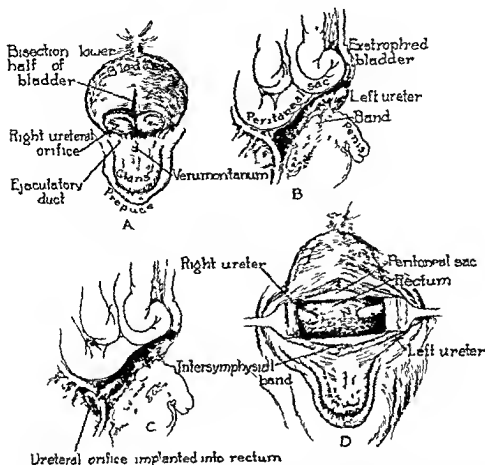


Fig 12 Fourth principle Bergenhem's method of extraperitoneal implantation of the intact ureterovesical orifice with a surrounding rosette of vesical mucous membrane A, Bisection of the lower half of the extrophied bladder and incision freeing rosettes around each ureteral orifice B Sectional view showing the ureter freed extraperitoneally C The ureter inserted into a slit in the rectum D, The transplanted ureters in place, the rectum exposed intersymphysal band below, peritoneum above (After Hutchins and Hutchins)

tomosis is the greatest drawback. Fistulas occurred in 14 (21.5 per cent) of the cases. However, leakage following the Bergenhem operation is due more to imperfect apposition of the ureter with the bowel than to a defect incident to suture. Being in the nature of a direct transplant (the second surgical principle), the method is open to the same objections. On a few occasions the ureter has escaped from the bowel. This complication may occur when there has been damage to the blood supply of the lower part of the ureter sufficient to cause necrosis or when too large an opening is made in the rectal wall, permitting the ureter to work out by means of its own peristaltic action or that of the intestine, or by movements of the patient.

The danger of peritonitis is minimized by the extraperitoneal approach. This is amply proved by the fact that peritonitis occurred in only 3 (4.6 per cent) of the cases.

The preservation of the ureterovesical orifice has not removed or noticeably lessened the com-

plication which it was originally designed to prevent—ascending urinary infection. Although the ureterovesical orifice is left intact, the divided portion of the vesical wall surrounding the trigone or rosette still opens the lymphatics, blood vessels, and tissue spaces to fecal contamination from the rectum. In view of the septic nature of the anastomosis, even the coaptation of mucosa to mucosa in the Maydl procedure cannot satisfactorily wall off these avenues of the spread of infection. Contrary to an often presented viewpoint, preservation of the ureterovesical orifice does not maintain the normal valve-like action which is present within the bladder. Robbed of its supporting stroma and autonomic nerve supply, the entrance at once becomes nothing more than a flimsy orifice which has no distinct advantage over the divided end of a ureter. The one possible virtue of the intact orifice lies in the possibility that the mucous covering which it possesses may play a rôle in the prevention of stenosis.

The fourth surgical principle is applicable to patients with an uninvolved trigone or ureteral orifices, such as those with ectropion and vesicovaginal fistula. It cannot be applied satisfactorily in cases of malignancy.

#### FIFTH SURGICAL PRINCIPLE—TEMPORARY DIVERSION AND DRAINAGE OF THE URINE

##### a. By ureteral catheters transrectally

- 1 With aural implantation. Second surgical principle. Giordano, 1892, experimental.
- 2 With preservation of the ureteral orifices. Fourth surgical principle. Peters, 1899.
- 3 With the submucosal principle. Ninth surgical principle. Coffey, 1925. Modified by Furniss, 1930. Nitch, 1932. Green Armytage, 1932.
- 4 With intact ureter. Eleventh surgical principle. Ferguson, 1931.

##### b. By preliminary nephrostomy. Heitz Boyer and Hovelacque, 1912. Hinman, 1926.

##### c. By extraperitoneal ureterostomy with a transfixion suture. First surgical principle. Hinman, 1935.

#### A. BY URETERAL CATHETERS TRANSRECTALLY

The first record of the temporary drainage of urine following a uretero-intestinal anastomosis dates back to 1892 when Giordano, in an experiment on a dog, used small ureteral tubes which he brought out through the rectum. The operation was a direct ureteral transplant executed by the extraperitoneal route. Death ensued shortly after the operation from rectal hemorrhage.

In 1894, Rein, in clinical practice, employed small glass tubes for ureteral drainage following a bilateral ureterorectal anastomosis by the direct method. Rubber tubes connected to the glass tubes were brought out through the rectum. The patient died shortly after the operation from an unknown cause.

Peters, in 1899, first used ureteral retention catheters in combination with the principle of preservation of the ureteral orifice in the Bergen hem operation.

The use of catheters did not gain popularity until 1925 when Coffey devised his second technique in order to permit a 1 stage bilateral submucosal transplantation. With catheters he hoped to prevent the temporary interruption of the urinary stream which is so frequently caused at the site of anastomosis by edema immediately following the operation. In placing a ligature around the end of the ureter as it coursed over the catheter he

intended to shut off the tissue spaces of the ureter and prevent ascending infection.

Coffey's second technique (Fig. 13) is performed after the rectum has been clamped off and lavaged clean (Fig. 13 A and B) by first packing the rectum with gauze through a sigmoidoscope (Fig. 13 C). The ureters are divided near the bladder, catheterized with as large a catheter as possible, and tied around a rubber cuff. The cuff consists of a rubber tube  $\frac{3}{4}$  in long which is tightly fixed at a point from 4 to 6 in from the tip of the catheter by 2 or 3 strong linen sutures, one of which is placed around the catheter itself (Fig. 13, D, E, and F).

Two oblique incisions  $1\frac{1}{2}$  in in length are made down to the submucosa of the rectosigmoid. These are placed low in order to make it possible to remove the catheters through a speculum introduced in the rectum should they become blocked. Narrowing of the bowel is prevented by placing one incision higher than the other (Fig. 13 G).

Two traction sutures of No. 0 chromic catgut are taken through the muscularis and serosa on either side of the lower extent of the incision in the bowel. A stab wound having been made through the submucosa and mucosa between the sutures, the ends of the catheters are attached to a bit of gauze drawn through the opening (Fig. 13 H). Upon withdrawal of the gauze from the rectum the catheters and ureters are guided into the incision. The traction sutures are tied together in order partially to close the rectal opening. A fine chromic catgut suture is taken through the wall of the ureter and the cut edge of mucosa on either side. After tying of this suture the ureter is snugly held in position. Other sutures through the serous and muscular coats serve to implant the ureter in its submucosal course.

Furniss, in 1930, modified the second technique of Coffey by passing the catheters into the bowel on a special trocar to prevent soiling. Nitch, in 1932, used a rectal tube made of lead to draw the ureters into the rectum. Green Armytage, in 1932, devised a stab instrument for passing the ureteral catheters through the mucosa into a Kelly cystoscope introduced through the anus by an assistant.

Ferguson, in 1931, employed ureteral catheters in his experimental 2 stage submucosal transplantation of the intact ureter which is discussed as the eleventh surgical principle (Fig. 31).

#### DISCUSSION

The outstanding objection to any form of ureteral catheter is its tendency to become blocked.

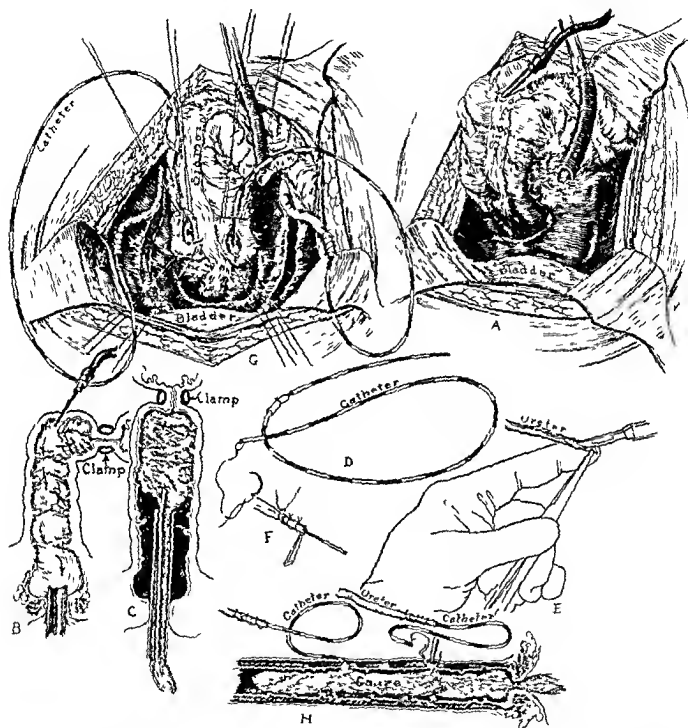


Fig. 11. Fifth principle Coffey's technique No. 2 (ninth principle) with the use of ureteral catheters and the submucosal principle. A, The bowel is clamped and the needle for irrigation inserted. B Sectional view showing irrigation in progress. C Packing the bowel with gauze. D The ureteral catheter size 12 F prepared with a rubber cuff for fixation of the ureter and a suture at its end to be attached to the gauze for withdrawal of the catheter by

way of the rectum. E, Splitting of the end of the ureter. F, Catheter inserted into the ureter and tied in place on the rubber cuff by sutures. One suture is tied around the ureter above the cuff. G The ends of the catheters are tied to the gauze in the rectum through stab wounds at the lower ends of the incisions which had been made down to the submucosal layer. H, Sectional view of G. (After Coffey.)

Even the larger sized catheters are prone to clog with bits of mucus, blood clot, epithelial cells, or calcareous incrustations. Poor drainage is the result, and infection follows. Acting in the nature of a foreign body, the catheter itself causes infection, either periureteral or renal. Another objectionable feature is the tendency toward anemic necrosis when the ureter is too tightly applied over the catheter. Gangrene leads to leakage and peritonitis.

#### B BY PRELIMINARY NEPHROSTOMY

Nephrostomy, preliminary to ureteral implantation was first suggested by Heitz Boyer and Hovelacque in 1912 as being useful from two points of view. In the first place, it reduces the infection of the kidneys which is present in most conditions amenable to uretero-intestinal anastomosis. In the second place, the diversion of the urine thus effected gives security during operation and in the days following by preventing contamination of the field of operation with urine which ordinarily is infected, and by permitting the wound to heal without danger of the complications which result from edema with occlusion of the newly formed orifice. Heitz Boyer and Hovelacque considered bilateral nephrostomy to be the most satisfactory method of diverting the urine and advised that the operation be performed three weeks prior to the uretero-intestinal anastomosis.

Hinman, in 1926, stressed the value of preliminary nephrostomy particularly in severe infections of the bladder, such as tuberculosis, and in malignancy of the bladder causing obstruction to the lower portion of the ureter. He found the method especially valuable in cases in which the remaining kidney was undergoing progressive hydropnephrotic atrophy because of obstruction of the transvesical portion of the ureter. In cases of congenital deformity such as exstrophy of the bladder in which the ureters are not enlarged and are functioning normally he found it of no advantage.

#### DISCUSSION

Nephrostomy is the most suitable measure for diverting the urine from the operative field in cases in which this is indicated before the establishment of a communication between the ureter and bowel. It may be instituted in the cases of patients who would be benefited by a ureteral transplant but are poor surgical risks because of upper urinary obstruction and renal infection. If necessary, such patients may be prepared over a long period before the uretero-intestinal implantation is done. In fact, in the presence of certain conditions, such as vesical tuberculosis, nephros-

tomy tubes may be worn indefinitely. While nephrostomy entails an operative procedure of a magnitude requiring a separate stage, the surgical risk is slight and is well outweighed by the advantages gained under conditions of abnormality of the upper tract.

#### C BY URETERAL CATHETERS PLACED EXTRA PERITONEALLY FROM URETEROSTOMIES ABOVE THE SITE OF IMPLANTATION

Hinman, in 1935, presented a method for the diversion of urine by the use of catheters placed extraperitoneally in ureterostomy openings above the site of implantation. This procedure was used in conjunction with Coffey's third technique with a transfixion suture, in order to divert the urine during the time required for the transfixion suture to cut through, thus to prevent urinary obstruction and render it possible to perform a simultaneous bilateral implantation.

In this method the ureter is exposed through a low midline or rectus incision by dissecting it free from the peritoneum above the pelvic brim. A No. 10 ureteral catheter is introduced into a small longitudinal slit made in the side of the ureter high in the area of reflected peritoneum as near the pelvic colon as possible, the distal end being brought out through the abdominal wound posterior to the peritoneum or through stab wounds in the groins. The ureter is then implanted intraperitoneally into the rectosigmoid according to Coffey's third technique (transfixion suture), the peritoneum is closed, and drains are placed extraperitoneally.

#### DISCUSSION

Although extraperitoneal ureteral catheters provide drainage until the transfixion sutures establish a fistulous tract into the bowel, their employment is equally as undesirable as that of any type of retention catheter. The objectionable features were well demonstrated in 2 of Hinman's 3 cases in which drainage was established with an extraperitoneal catheter. In a patient who recovered imperfect drainage by the catheter was followed by acute pyonephrosis necessitating nephrectomy, and in a patient who died, necropsy revealed an acute renal infection with the formation of an abscess, acute ureteritis, and periureteritis above the ureterostomy, and an anemic infarct below it.

The cases in which the principle of temporary diversion of the urine has been applied have not been analyzed separately, but are discussed in connection with the more fundamental principle with which this procedure has been combined, as is indicated in the classification.

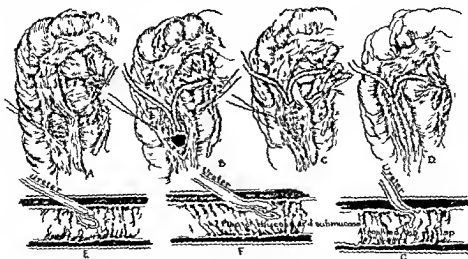


Fig. 14 Sixth principle Fowler's method of forming a flap of submucosa and mucosa to act as a valve A, Incision on the anterior wall of the rectum through the serosa and muscularis, exposing a diamond shaped area of submucosa. Outline of the incision through the submucosa and mucosa for raising a tongue shaped flap B The obliquely divided ends of the ureters sutured side by side on the presenting mucosal surface of the flap C Flap inserted into the lumen of the bowel and the opening closed by uniting the outer edges of the mucosal submucosal layers with interrupted sutures D, Closure of the muscularis and serosa with a line of interrupted sutures E, Sectional view showing the position of the flap with the bowel empty F The flap being directed over the ureteral orifice with the passage of feces G, The probable atrophied fate of the flap (After Fowler and Coffey)

### SIXTH SURGICAL PRINCIPLE—USE OF A FLAP TO ACT AS A VALVE

- Flap of the entire intestinal wall Vignoni, 1895, experimental
- Flap of submucosa and mucosa Fowler, 1896
- Flap of the trigone The fourth surgical principle Pisani, 1896, experimental

#### A FLAP OF THE ENTIRE INTESTINAL WALL

Vignoni, in 1895, was the first to employ the principle of the use of a flap of the intestinal wall (or a part of it) at the site of ureteral implantation. His intention was to reproduce the structural arrangement existing in animals possessing ureters which open into a cloaca. Using dogs, he implanted single ureters upon a V shaped flap cut out of the anterior rectal wall. After being placed upon the flap the ureter was buried by careful suture of the 2 lateral folds of bowel over it. Of 7 dogs, 1 recovered and lived for more than two months.

#### B FLAP OF SUBMUCOSA AND MUCOSA

One year later Fowler applied the principle of the formation of an internal flap (Fig 14). He attempted to construct an efficient permanent valve of mucous membrane so covering the open mouths of the ureters as to close the ureteral

orifices when the rectum became filled with urine and protect them when fecal matter descended from above. As an additional safeguard against ascending infection, he advocated the submucous principle of oblique insertion in which the ureters are brought on the submucosa of the rectal wall for a distance of 3 or more centimeters before they enter the intestinal lumen. He claimed that in this situation the circular fibers of the bowel compress the ureters and secure occlusion during the act of defecation.

Fowler's flap is constructed by making an incision 7 cm. long on the anterior wall of the rectum through the serous and muscular coats. These layers are dissected laterally until the submucosa is bared in a diamond-shaped area. A tongue-shaped flap of mucous membrane and submucosa, with its base directed upward, is next cut from the lower half of the diamond. This flap is doubled upon itself in such a manner that one-half of its mucous surface presents anteriorly, where it is fixed with 1 or 2 catgut sutures. In this way a flap, both sides of which are covered with mucous membrane, is secured.

The ureters are placed side by side in the incision so that their obliquely divided ends lie upon the presenting mucosal surfaces of the flap. A few fine catgut sutures serve to secure the ureters in the submucosal space. The flap with the attached

ureters is inserted into the cavity of the rectum and the rectal wound closed in layers over it.

Duval and Tesson (1899) further studied this type of operation in dogs, with special regard to the oblique submucous course of the ureters and the formation of a mucosal valve. From their experiments which proved unsatisfactory, they came to the conclusion that it was impossible to reproduce surgically the mechanism of the ureterovesical orifice in anastomosing the ureter to the digestive tract.

### C FLAP OF THE TRIGONE

Another experimental method based on the flap principle was combined with Maydl's technique by Pisani in 1906. Pisani resected a square area of trigone bearing the ureters and fixed it to a freshened portion of the posterior rectal mucosa by means of silk sutures. The flap was introduced through an anterior rectal incision which was thereafter closed, the ureters entering at either extremity. Two dogs upon which the method was tried died in sixty-two hours and six days respectively, the first of operative shock, the second, of peritonitis. The kidneys and ureters were found to be normal, the urine uninfected, and the flaps adherent in both animals.

### SUMMARY OF CASES

The Fowler operation has been performed on only 4 patients. Three died shortly after the operation, the surgical mortality being therefore 75 per cent. The fourth was well and free from evidence of renal infection when observed three and one-half years later. Urinary infection accounted for 2 of the deaths, urinary obstruction for the third. These cases are analyzed in Table VII. The remaining procedures based on the flap principle (Vignoni and Pisani) have not been subjected to clinical trial.

### DISCUSSION

The idea that a flap might be formed to act as a valve is closely related to the submucosal principle used experimentally by Krynski in 1896 and popularized later by the splendid experimental and clinical studies of Coffey (ninth surgical principle). However, the flap employed by Vignoni, Fowler, and Duval and Tesson fails in practice because it undergoes rapid atrophy following the operation.

Pisani's procedure is irrational, yet one is attracted by the bold ingenuity which inspired the originator to form a valve by stringing the ureters across the rectum as a means of fixing a trigonal flap to the mucosa of the posterior wall. The most

TABLE VII.—THE FORMATION OF A VALVE BY THE USE OF A FLAP WITHIN THE BOWEL (FOWLER'S METHOD) SIXTH SURGICAL PRINCIPLE

Condition	I. Congenital anomalies and trauma	II. Vesical infection (ulcer)	III. Malnutrition	IV. Not stated	Total
Number of cases	2		1	1	4
Deaths					
Surgical	3		1	1	5
Late	1				
Causes					
Shock	3				
L					
Pneumonia	1				
L					
Urinary infections	1		1		
L					
Urinary obstruction	1			1	
L					
Peritonitis	1				
L					
Bowel obstruction	1				
I					
Not stated	1				
L					
Total deaths	2		1	1	4

objectionable feature in the operation is the long extent of unprotected ureter which is allowed to lie in the rectum. An arrangement of this kind exposes the ureters to the repeated trauma of the passing urine and feces as well as opening them to a continual source of infection.

### SEVENTH SURGICAL PRINCIPLE—USE OF MECHANICAL DEVICES

- The button of Boari (1895)
- The copper tubes of Chalot (1896)
- The bobbin of Evans (1899)
- The "dress-snap" of Zollinger (1934), experimental

#### A THE BUTTON

In 1895 Boari introduced the principle of a mechanical device for performing uretero-intestinal anastomoses. As a means of preventing stenosis and ascending urinary infection he designed buttons which were of sufficient size to assure a wide opening upon sloughing their way into the rectum (Fig. 13).

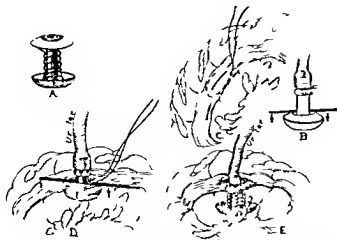


Fig 15 Seventh principle Boari's mechanical button A, Button open B, Stylet compressing spring and holding disks together End of ureter drawn over the collar like head of button and held with a silk ligature C, Incision in rectal wall for introduction of button D, Disk end of button introduced into bowel lumen, stylet remaining outside E, Pursestring suture tied, stylet removed, wall of bowel brought into close contact with end of ureter by traction of spreading disks (After Boari)

From 4 sizes it was possible to choose a button adapted to the size of the ureter. The buttons consisted of 2 disks mounted upon a hollow stem which served for the passage of urine. The disks remained spread apart by a spring which in preparation for the operation was compressed and held in position by a stylet passed transversely through 2 apertures in the stem. The end of the ureter was drawn over the collar-like head of the button and secured with a silk ligature. The disks were inserted into the lumen of the bowel through a small rectal incision, and the bowel closed around the stem of the button with a pursestring suture, the stylet being left outside. Upon withdrawal of the stylet the end of the ureter was brought into firm contact with the wall of the bowel by the traction exerted by the immediate spreading of the disks. Boari advised an extraperitoneal approach for the operation.

Meeting with success in carrying out this procedure on 4 dogs, Boari performed a unilateral transplant in a patient suffering from a vesico-vaginal fistula. Six months later the patient was well, she passed part of her urine by rectum and the remainder by vagina. In a previous case, one of tuberculous cystitis in which Casati performed a unilateral transplant, death resulted after thirty-five days from advanced tuberculosis of the lungs, peritoneum, and bladder.

Boari subsequently modified his button so that it would not cut through so rapidly. He also made the head more blunt so that it would not injure

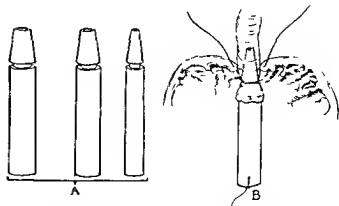


Fig 16 Seventh principle The copper tube method of Chalot A Various sizes of the tubes B, Sectional view of uretero-intestinal transplant by the use of a tube (After Chalot)

the rectum in being passed. Later he devised a button for a lateral ureteral transplant which was to assure a still larger orifice for the prevention of stenosis.

Boari carried out further experiments in the preservation of the ureterovesical valve by attaching to the button either the entire trigone (Maydl) or single ureters with a rosette of surrounding vesical mucous membrane (Bergenhem).

Roux, in 1900, anastomosed the right ureter to the appendix with a Boari button. The patient died from peritonitis resulting from gangrene at the site of the anastomosis.

#### B THE COPPER TUBES

The first successful bilateral uretero-intestinal implantation after an operation for malignancy was performed by Chalot in 1896 with another mechanical device. Chalot used cylindrical nickel-plated copper tubes which tapered in the form of a cone at each end (Fig 16). These were fixed in the ureter by a ligature and implanted in the intestine with sutures placed through the serosa and muscularis.

Through a perforation in the lip of the intestinal end of the tube was passed a loop of silk which served either of two purposes. It fixed a catheter to the end of the tube or acted as a means of traction for removing the tube by way of the rectum should it remain in place too long without sloughing through. Chalot made the lumen of the tube as large as possible to overcome the danger of occlusion by calcareous incrustations.

In 1898, Lestrade used Chalot's tubes for uretero-intestinal implantation in 4 dogs. The result was fatal in each instance, the animals dying of renal insufficiency, leakage of urine into the peritoneal cavity, and peritonitis.



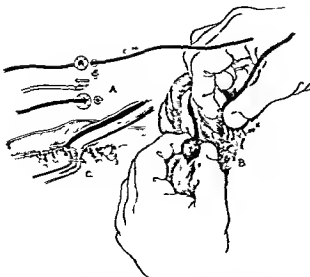


Fig. 1. Seventh principle Zollinger's mechanical drainage button. A. The drainage button, similar to the male and female portions of a dress snap, with sections of a No. 7 ureteral catheter attached, the female portion to the left, the male to the right. B. The female portion grasped through the mucosa and submucosa in the incision in the bowel, the male portion about to be snapped into place. C. Sectional view of completed anastomosis. (After Zollinger)

#### C THE BOBBIN

Evans, in 1899 performed a unilateral uretero-rectal transplant by means of a bobbin. Although a fecal-urinary fistula developed the patient was well thirteen months later.

Mechanical devices proved so unpopular that no further experimental or clinical transplantations were made with them until 1934.

#### D THE DRESS-SNAP

In 1934 Zollinger revived the method in presenting a device for which he claimed an aseptic technique, protection of the end of the ureter for a sufficient period to allow occlusion of the lymphatics and at the same time free drainage of urine.

In developing his drainage button Zollinger first devised a modification of the common dress-snap. Later he made a rectangular metal box which was designed to permit the end of the ureter to project into the lumen of the bowel. However, the box was too large permitting a slough and the frequent development of peritonitis. Finally Zollinger perfected a small drainage cap made in 2 parts, a female and a male (Fig. 17). Each part is attached to sections of a No. 7 whistle-tip ureteral catheter divided 6 in. from the tip one catheter extending up the ureter and the other

out through the anus. The female portion of the button, with the end section of the catheter attached, is inserted through the anus into the rectum and brought beneath the rectal incision which has been made down to the submucosal layer. It is grasped between the thumb and index finger of the left hand and held in place against the mucosa. The male portion fixed to the 6-in. length of the tip of the catheter is then snapped into the hidden female portion, perforating the mucosal-submucosal layers.

After it has been proved by the injection of sterile fluid that both parts of the button and the 2 catheters are clear, the ureter is threaded onto the catheter of the male portion and fixed by the previously placed sutures. The end of the ureter is likewise anchored to the mucosa in order to hold it in place after the sloughing out of the button. A submucosal implantation of the ureter completes the anastomosis.

Zollinger performed unilateral transplants in 18 dogs, with good results in 6. One serious difficulty was that the dogs bit out their rectal catheters.

TABLE VIII—SECURING A BETTER ANASTOMOSIS MORE SAFELY BY THE USE OF MECHANICAL DEVICES (BOARD) SEVENTH SURGICAL PRINCIPLE

Complication	I. General abdominal and trauma	II. Vascular action (shock)	III. Malignancy	IV. Not stated	Total
Number of cases	3		8		11
Deaths					
Surgical	5	1	6		7
Late	L				
Causes					
Shock	S		1		
L	L				
Pneumonia	S				
L	L				
Urinary obstructions	S	1	3		
L	L				
Urinary obstruction	S				
L	L				
Peritonitis	S		1		
L	L				
Bowel obstruction	S				
L	L				
Not stated	S		1		
L	L				
Total deaths	0	1	6		7

too soon after the operation. Although the operation has not been applied clinically, Zollinger believes that the results should be more satisfactory because of the larger caliber of the human ureter.

A contrivance which screws together, which Zollinger is still developing, he believes will be an improvement over the present dress-snap, the insecure coaptation of which has caused failure in a small proportion of his operations.

#### SUMMARY OF CASES

The 13 operations which have been performed by the use of the various mechanical devices are analyzed in Table VIII. Seven deaths are reported, all surgical. The mortality was therefore 54 per cent. Renal infection was the most frequent complication, having occurred in 4 cases (30.8 per cent). Fistulas and peritonitis developed in 2 cases each (15.4 per cent).

#### DISCUSSION

The many, obvious disadvantages of the use of any mechanical device—the danger of urinary obstruction, of gangrene of the ureter and bowel, of peritonitis—are so overwhelming that the one advantage, that of shortening a technically difficult and prolonged operation, is completely outweighed.

#### EIGHTH SURGICAL PRINCIPLE—IMPLANTATION INTO STRUCTURES WHICH OPEN NORMALLY INTO THE GASTRO-INTESTINAL TRACT

- a Appendix Roux, 1900, Eaton, 1910
- b Pancreatic duct Baird, Scott, and Spencer, 1917, experimental
- c Gall bladder Dardel, 1922, experimental, Kehl, 1923, experimental

#### A THE APPENDIX

Roux anastomosed the right ureter to the appendix by the use of a Boari button in 1900. The first uretero-appendiceal implant by suture was performed by Eaton on March 6, 1910. Eaton advised an appendiceal transplant because of the following facts which, he claimed, reduce the possibility of ascending urinary infection: 1. There is less putrefaction in the cecum than in the rectum. 2. A natural canal facilitates transportation of urine and eliminates muscular mutilation elsewhere. 3. The opportunity for peritoneal contamination is lessened. 4. The operation does not hinder peristalsis, ileus being therefore a less likely complication. 5. The ileocecal valve forms a pseudo-valve over the orifice of the appendix.

The technique consists in amputating approximately  $1\frac{1}{2}$  in. of the end of the appendix and

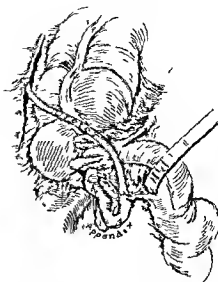


Fig 18 Eighth principle: Eaton's method of end to end anastomosis of the right ureter to the appendix (After Beck.)

suturing the transversely divided end of the ureter directly over the lumen of the appendix by interrupted sutures made in 2 or more layers (Fig 18).

Babcock, on April 22, 1910, carried out a similar end to end anastomosis of the right ureter to the appendix, modifying the operation by making an extraperitoneal transplant.

#### SUMMARY OF CASES

Ten uretero-appendiceal transplants collected from the literature are analyzed in Table IX. The operative mortality was 60 per cent. Of the complications following the operation, renal infection, peritonitis, and urinary obstruction were most frequent, each occurring twice.

#### B PANCREATIC DUCT

Baird, Scott, and Spencer (1917), using dogs as experimental animals, guided the end of the ureter into the lumen of the duodenum through the pancreatic duct. They found that the implanted ureter and kidney functioned normally and did not become infected although the dogs died in from seven to twelve days if the other kidney was removed. Death resulted, in their opinion, from uremia caused by the re-absorption of urine from the upper gastro-intestinal tract. They concluded that a valve was not necessary at the uretero-intestinal junction.

#### C GALL BLADDER

Dardel, in 1922, and Kehl, in the following year, implanted the right ureter to the gall bladder by the direct method. They, too, were seeking a

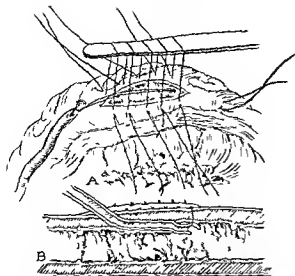


Fig. 20 Ninth principle. The submucosal method of Coffey (Technique No. 1) A The anchoring suture after transfixing the end of the obliquely divided ureter enters the lumen of the gut through a stab wound at the lower most point of the incision previously made down to the submucosa and emerges through all layers of the intestine  $\frac{1}{4}$  in farther along B Sectional view of the transplant showing the submucosal course of the ureter and the anchoring suture tied (After Coffey) Compare B with C in Figure 9 (Stiles)

stances and total destruction of the kidney in the sixth

The operation described by Coffey as his first technique (Fig. 20), is carried out intraperitoneally and preferably in 2 stages. After the ureter has been located, dissected free and divided, the end is prepared by slitting it for a short distance. A linen suture is passed through the entire wall near the extremity and tied on either side, the loose ends being threaded on 2 needles. The submucous canal is prepared by incising the intestine at the elected site through the serous and muscular coats until the mucosa pouts through the incision. Five or 6 interrupted sutures which catch the peritoneum and muscular layers are introduced. The uppermost suture is tied and used as a control suture, the intermediate sutures being held away from the wound with a flat instrument. The end of the ureter is brought beneath the sutures and the needles are passed through a stab wound made in the mucosa at the lowest point of the incision. The needles are brought out  $\frac{1}{4}$  in farther along from  $\frac{1}{8}$  to  $\frac{1}{4}$  in apart. The ureter being drawn snugly down this anchoring suture is tied outside the intestine incorporating all layers. The ureter is tacked to the serosa of the intestine at its point of entrance by a few fine sutures, those previously

laid being tied, thus enclosing the ureter in the submucosal space. The other ureter is implanted in like manner from two to three weeks later. An important point in the technique, according to Coffey, is the placement of a rubber sheet with multiple wick drains down to the site of the implantation. Coffey called this the "quarantine drain."

In 1931, Middleton published an article in which he claimed that, on March 1, 1911, he had performed the first operation on a human subject by Coffey's first method. He reported that the patient, a boy seventeen years of age who was suffering from exstrophy, was living and well twenty years later.

Previous to Middleton's claim, it was generally believed that Mayo was the first to apply Coffey's principle of submucosal transplantation in man. Mayo performed a 2 stage operation on February 3 and February 23, 1912. Coffey did not perform his operation in a clinical case until October 17, 1915.

#### C. COFFEY MAYO OPERATION

Mayo in 1912, slightly modified Coffey's original technique by introducing a catgut urine guide. In this modification, an end of No. 2 chromic catgut 6.25 cm. in length is left protruding up the ureteral lumen, through the site of the anastomosis. Mayo claimed that by following this guide the urine can always leak out of the bowel regardless of slight kinks which might otherwise be obstructive. This modification, together with other less important changes such as the use of the intestinal clamp, proved so popular that the method of implantation became widely known as the 'Coffey Mayo operation.'

Markoff in 1934, described a slight modification of the Coffey Mayo operation. He sutured the ureter to the bowel prior to embedding it submucosally and slit the end for a distance of from 0.5 to 1 cm. before placing the anchoring suture in order to prevent obstruction when edema takes place during the early days following the operation.

In the same year, Everidge presented an inflatable intestinal bag to facilitate and increase precision of the incision down to the mucosa in the submucous operation.

#### D. CABOT'S EXTRAPERITONEAL TECHNIQUE

In 1921 Cabot described his technique for performing the submucosal operation of Coffey extraperitoneally (Fig. 21). This method was used also by Judd, and in 1935 Lahey described a similar procedure.

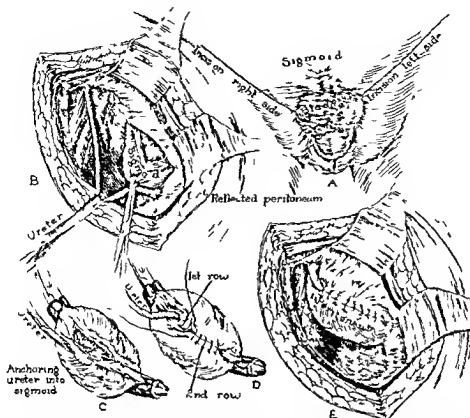


Fig. 21. Ninth principle. Cabot's extraperitoneal modification of Coffey's submucosal implantation of the ureter (technique No. 1). A, The line of skin incisions. B, The ureter is freed and the sigmoid drawn through the opening made in the peritoneum. C, Submucosal implantation of the ureter as in the Coffey No. 1 technique. D, A second row of sutures in the wall of the sigmoid closing in the site of implantation (tagenahrt). E, Suture of peritoneum over the site of implantation. (After Cabot.)

#### E. COFFEY'S SECOND TECHNIQUE

In 1925, Coffey presented his second technique, a 1 stage bilateral submucosal transplant with catheters. This has been discussed in the section on diversion of the urine (fifth surgical principle).

#### F. FURNISS' MODIFICATION

Furniss, in 1928, advised retaining the peritoneal attachment to the ureter when freeing the portion for anastomosis by the second technique of Coffey. He did this for better preservation of the blood supply to the lower ureter.

#### G. APPROACH TUNNELS

Papin, in 1925, carrying out Coffey's type of submucosal transplant, devised a method for tunnelling beneath the muscularis of the bowel by making 2 transverse incisions 15 mm long and about 3 cm apart.

Mayo, in 1930, further modified the Coffey-Mayo operation by tunnelling beneath the muscularis through horizontal nicks, in a manner similar to Papin's modification (Fig. 22).

In the same year, Walker-Taylor developed his method of tunnelling when performing the submucosal transplant. After making a small transverse incision through the serosa into the muscularis, a blunt instrument is introduced into the wall of the gut between the mucosa and the circular muscle layer to form a tunnel for a distance of from 1.8 to 2.5 cm. According to Walker-Taylor's first plan, called the "technique of the open tunnel," the mucosa which presents at the end of the tunnel is opened with a thin knife or pair of scissors and the ureter is implanted with an anchoring suture, as in Coffey's first technique. The entire operative area is then buried by means of a longitudinal suture line which picks up the peritoneum and muscle on either side. Walker-Taylor stated that ureteral catheters can also be used with this method.

In a second plan, known as the "technique of the closed tunnel," the tunnel is made in a like manner, but the mucosa at the end of the tunnel is perforated with an instrument shaped like a pencil. Upon withdrawal of this instrument, a

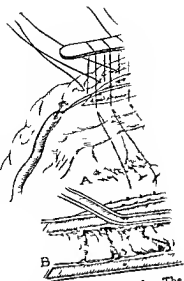


Fig 20 Ninth principle The Coffey (Technique No 1) The transfixing the end of the obliquely the lumen of the gut through a stab most point of the incision previous submucosa and emerges through all in farther along B Sectional vi showing the submucosal course of the anchoring suture tied (After Coffey) in Figure 9 (Stiles)

stances and total destruction of the sixth

The operation described by Coffey technique (Fig 20) is carried out in and preferably in 2 stages. After been located, dissected free and the is prepared by slitting it for a short. A linen suture is passed through the ends of the extremity and tied on either ends being threaded on 2 needles. The canal is prepared by incising the in the selected site through the serous and mucosa until the mucosa pouts through the incision. or 6 interrupted sutures which catch the neuromuscular layers are introduced. The uppermost suture is tied and used as a guide. The intermediate sutures being from the wound with a flat instrument of the ureter is brought beneath the suture. The needles are passed through a stab wound in the mucosa at the lowest point of the incision. The needles are brought out  $\frac{3}{4}$  in apart from  $\frac{1}{8}$  to  $\frac{1}{4}$  in apart. The ureter being snugly down, this anchoring suture is tied to the intestine, incorporating all layers. The is tacked to the serosa of the intestine at the entrance by a few fine sutures, those pro-

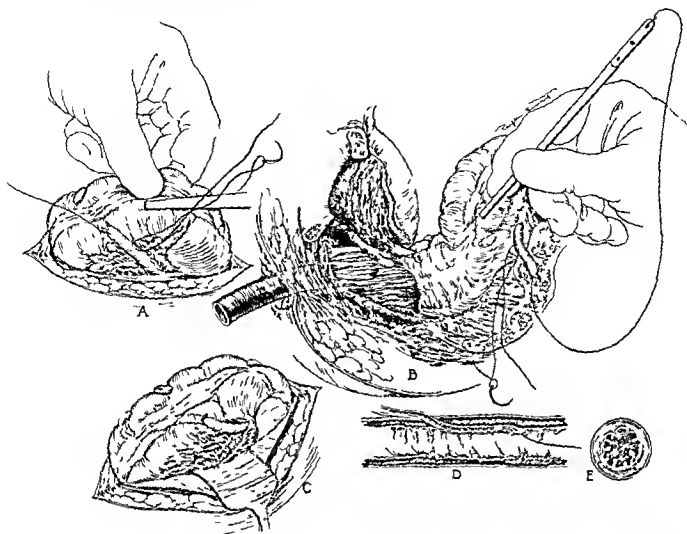


Fig. 24 Ninth principle Walker Taylor's aseptic irreversible tunnel technique A modification of Coffey's submucosal technique No. 1 A The tunnel being formed between the muscularis and the submucosa with the blunt dissector B Piercing instrument in the tunnel pointing into the rectal cylinder just about to perforate the inter-

vening layer of the mucosa and submucosa C The operation complete Eight millimeters of ureter projecting into the bowel fixed by a silk ligature attached at the anus D, Longitudinal section showing the submucosal course of the ureter E Cross section of the submucosal course of the ureter (After Walker Taylor)

of a triangle (Fig. 25) near the apex of which the incision for insertion of the ureter into the bowel will be made later (Fig. 26) so that, when tied, the ureter is sealed in without constriction and the closure is secure against leakage. In order to be aseptic, the sutures must pierce only the adventitia of the ureter and only the submucosa of the bowel. The end of the ureter is tied to the carrier (Fig. 23, a and b). A longitudinal incision of the submucosal mucosal layer,  $1\frac{1}{2}$  times the diameter of the ureter in length, is made with an active electric knife (without coagulation) in the apex of the triangular area marked out by the anchoring sutures (Fig. 26). The end of the ureter is pushed through this into the lumen of the bowel with the carrier, the end piece of which is detached in the bowel so that nothing is withdrawn and

there is no chance for contamination of the wound (Fig. 27). The 3 anchoring sutures when tied seal the opening (Fig. 28). The muscular layers of the bowel are brought together over the ureter in its submucosal channel, and the site of implantation is covered with the flap of peritoneum left after isolation of the ureter. The abdomen is closed without drainage.

#### J THE ASEPTIC SUBMUCOSAL TRANSPLANT USING AN ELECTRIC SNARE THROUGH THE RECTUM

Foley, in 1936,<sup>1</sup> suggested a method whereby a strictly aseptic submucosal transplant can be accomplished by the use of an electric snare. The snare consists of a rigid tungsten wire in the form of a ring which can be moved over a perfor-

<sup>1</sup>Personal communication.



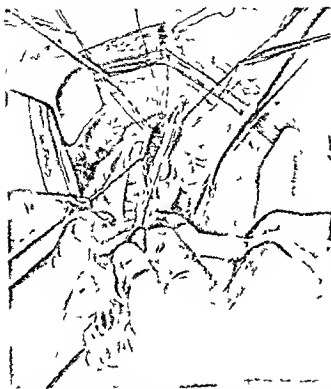


Fig. 26 The method of inserting the ureter with the probe through the opening into the bowel made by the cautery. After the ureter is inserted the mosquito clamps with rubber guards which are not shown in the illustrations on the loops of sutures Nos. 1, 2 and 3 are withdrawn and these sutures are drawn tight and tied thus anchoring the ureter in position as shown in Fig. 28.

the forceps the security of the grip is made certain and then fixed by the locking device at the proximal end. The ureter is then implanted submucosally by sutures similar to those employed in Hinman's technique. Amputation of the end of ureter with its covering of submucosa is accomplished with the high frequency current at any time after the operation that may be selected by the surgeon.

A unilateral transplant by this method was executed by Foley in a case of carcinoma of the urethra. Convalescence was satisfactory until one month after the operation, when the patient died of lobar pneumonia. At necropsy, the implanted kidney and ureter and the ureterosigmoidal orifice were found normal. There was, however, a small abscess between the ureter and muscularis at the upper end of the embedded segment.

#### A. ASEPTIC SUBMUCOSAL TRANSPLANT BY USE OF A BARR (PALMER, 1936)

Palmer's aseptic method of submucosal transplantation of the ureter will be discussed under the eleventh principle (Fig. 36).

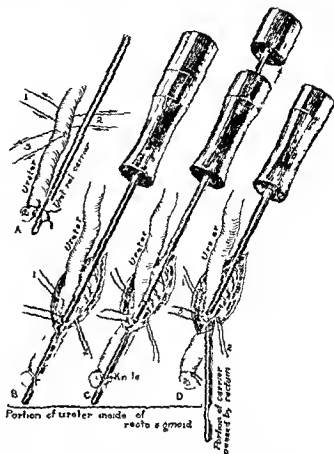


Fig. 27 Illustrates the use of a divisible carrier for insertion of the end of the ureter into the lumen of the bowel. A The end of the ureter is being ligated to the fenestration in the ureteral carrier. B The end of the ureter, ligated to the fenestration in the ureteral carrier, has been introduced through an opening previously made with the cautery. Sutures 1, 2, and 3, penetrating the submucosa of the rectosigmoid as well as the adventitia of the ureter are tightened so as to hold the ureter in place. C The knife of the ureteral carrier dividing the ligature which frees the end of the ureter and the end of the carrier within the lumen of the bowel. D The end piece of the ureteral carrier freed within the rectum, when the stylet is withdrawn into the handle. The remaining portion of the instrument has not been contaminated. The anchoring sutures Nos. 1, 2 and 3 are drawn taut and tied sealing the opening in the mucosa and submucosa.

#### SUMMARY OF CASES

Two hundred and fifty-nine operations performed with use of the submucosal principle resulted in 78 early deaths, a surgical mortality of 30 per cent.

The complication of highest frequency was renal infection, which occurred in 73 cases (28 per cent). Other common sequelae were peritonitis in 22 cases (9 per cent), urinary obstruction in 20 (8 per cent), the formation of fistulas in 20 (8 per cent), and intestinal obstruction in 18 (7 per cent). These cases are analyzed in Table X.



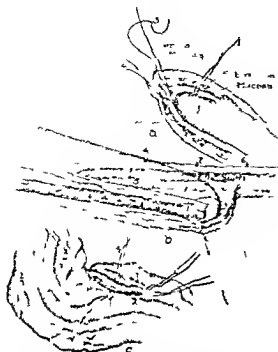


Fig 28. Diagrammatic representation of the manner in which the ureter is anchored in the wall of the intestine by the sutures a. How the sutures Nos 1, 2 and 3 anchor the ureter snugly in the small opening through the submucosa and mucosa made by the cautery and why this slit should not be too large but of a size as indicated by the dotted circle equal to the diameter of the ureter b. The uncontracted anastomosis which is secured c. How the fourth and fifth sutures anchor the ureter in the trough of the incision

#### DISCUSSION

Undoubtedly the submucosal principle of uretero-intestinal implantation is the most widely accepted at the present time and most closely approaches the normal route of the ureter into the cloaca in the fowl. The submucosa is its only layer of the bowel which will hold sutures satisfactorily. The chief virtue of the method lies in the firm union which can thus be formed between the ureter and bowel.

The importance which Coffey placed upon the principle of the formation of a valve is open to question. He claimed that, as a non motile, reliable gate which acts to prevent reflux, the 'technical' active in animate or inanimate mechanism (Fig 2) valve constitutes the ideal junction for the entrance of the ureter into the bowel. The importance of the valve seems to lose significance when one considers the lack of synchronization between the peristaltic contraction of the ureter and the contraction of the bowel, and the tendency which

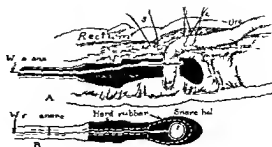
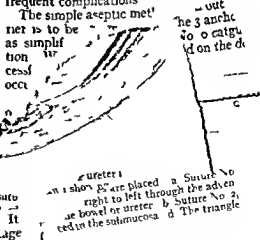


Fig 29. Ninth principle. Foley's aseptic submucosal transplant by use of an electric snare. A: Ureter implanted submucosally, end of ureter with tent of mucosa and submucosa grasped by electric snare introduced through anus. Sutures 1, 2 and 3 placed between adventitia of the ureter and submucosa of the bowel. B: View of electric snare from above.

muscular ureteral walls up to the uretero-intestinal orifice, which often projects into the intestinal lumen as a muscular papilla and the low pressure which exists in such a distensible structure as the rectum.

The use of approach tunnels tends to assure a firmer anastomosis. However, there is difficulty in developing the proper plane of cleavage in the proper axis to the ureter, with resultant of the muscularis and premature perforation of the mucosa as well as linking of the frequent complications.



The simple aseptic method. The 3 anchor sutures are placed right to left through the adventitia of the bowel or ureter. The triangle is formed in the submucosa.

TABLE \ —THE SUBMUCOSAL PRINCIPLE (VALVE ACTION) NINTH SURGICAL PRINCIPLE

Condition	I Congenital anomalies and trauma			II Vesical infection (ulcer)			III Malignancy			IV Not stated			Total			Summary
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	
Number of cases	47	10	53	0		10	34	3	73	1	5		01	22	140	259
Deaths																
Surgical	S	6	1	12	1		2	15	1	37			1	22	2	54
Late	L	2		6	2		8		15				12		21	33
Causes																
Shock	S	1		2	5		3		4			1				
L	L															
Pneumonia	S						2		4							
L	L	1		0	5	1										
Urinary	S	1		3	5		5	0	3	14		1				
infections	L	1		0	5	1				1						
Urinary	S	1		2			1	5		5						
obstruction	L			3						1						
Peritonitis	S	1	5		3	5	1	0	5	0	5	6	5			
L	L			1												
Bowel	S	1	5		0	5										
obstruction	L															
Not stated	b		1	1			1	3		8						
L	L			1			8		13							
Total deaths		8	1	18	1		2	23	1	52	0		3	34	2	111

For the purpose of analysis all intraperitoneal submucosal transplants without the use of catheters have been grouped under 1. These cases include Divisions a, b, c, f, g, and i in the classification.

Extrapertoneal transplants without the use of catheters are grouped under 2 (Division c).

All submucosal transplants by the use of catheters are grouped under 3 (Divisions e and g).

Cases operated upon by Coffey's technique No. 3 (Division b) have been analyzed under the first principle.

followed by a minimal incidence of late ureteral complications.

#### TENTH SURGICAL PRINCIPLE—TEMPORARY COLOSTOMY

- For the purpose of direct inspection and treatment of the site of implantation Barber, 1915
- Preliminary to implantation for the purpose of sterilizing the bowel and after implantation for temporary diversion of the feces Nesbit, unpublished, Higgins, 1931

#### A FOR DIRECT INSPECTION AND TREATMENT

In order to permit direct inspection of the site of uretero-intestinal anastomosis and to make possible direct treatment of the ureters if complications arose, Barber, in 1915, devised an experimental method which incorporated the first stage of a colostomy. The ureters, having been divided near the bladder, were made to penetrate the wall of the spur of colon at 2 points. Entering perpendicularly above, they were brought out at a

point 90 degrees distant on the intestinal wall. They were thus drawn into the lumen of the gut and out again through each wall. Finally, the sigmoid was suspended in the wound by the usual glass-rod method of colostomy, and the ligated end of the ureter was attached to the nearby skin with a suture (Fig. 30).

Barber temporarily interrupted the urinary stream by deferring incision into the end of the ureter until six hours after the operation. He stated that at any time after this the ureter could be returned to the lumen of the bowel, but he advised that it be maintained under control until its continued patency was assured. The operation, which could be executed in twenty minutes, was successful in 7 of 8 dogs.

#### B FOR THE TEMPORARY DIVERSION OF FECES

Nesbit recently suggested<sup>1</sup> the principle of a temporary colostomy for the purpose of sterilization of the lower bowel by through and through irrigation preliminary to ureteral implantation,

<sup>1</sup>Personal communication.

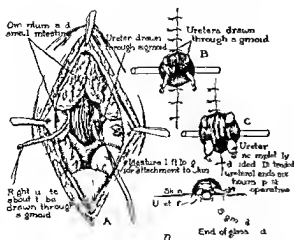


Fig. 30. Tenth principle. Implanting ureters into a loop of sigmoid brought out on the abdominal wall by the method of Parbar. A Ureters ligated and divided near the bladder. The left has been made to penetrate the entire wall of the sigmoid at 2 points. B Spur of sigmoid brought out on abdominal wall over a glass rod; abdominal incision closed; ligated ureters passing in and out of the sigmoidal lumen. C Six hours after operation an incision has been made in the end of the left ureter to release the urine. D Sectional view of the spur of sigmoid and right ureter. (After Barber.)

the bowel opening to be used after implantation for the temporary diversion of feces. The same idea was applied by Higgins (September, 1931) in an experimental study on dogs. He made a permanent colostomy through which the lower segment of bowel was irrigated with boric acid and mercurochrome for one week before performing a bilateral uretero-intestinal implantation.

#### DISCUSSION

In a consideration of Barber's method it would seem that intestinal obstruction at the sigmoid spur would be a complication to be feared. There would be the possibility, too, that urine would be dammed back into the upper large bowel instead of drained into the rectum. Other drawbacks are the temporary interruption of the urinary stream, the long extent of unprotected ureter which must be dissected from its bed to present outside the abdominal wall, and the added magnitude of the operative procedure. These objections far outweigh whatever advantage might be gained from inspection and treatment of the site of anastomosis.

The Nesbit-Higgins principle of temporarily diverting the fecal current until healing of the site of anastomosis has occurred is worthy of consideration as a possible measure to prevent as-

cending urinary infection. With tissue spaces, blood vessels, and lymphatics completely sealed off, there should be less likelihood of this complication than if fecal matter were to come into contact with the operative site before healing is complete.

However, the results of exclusion operations (discussed in detail in the first part of this paper) in which parts of the sigmoid or rectum have been partially or completely removed from the fecal current have been most discouraging. There has been no reduction in the incidence of ascending urinary infection following their use. The important fact seems to be that it is impossible completely to sterilize the large bowel by any amount of thorough and through irrigation or other form of treatment. The few bacteria which always remain in the crypts of the mucosa are sufficient to multiply in the urine which enters the rectum as soon as a ureteral transplant has been performed. The urine then acts as an ideal culture medium and produces a bowel content bacteriologically not markedly different from fecal matter itself.

No clinical cases in which the principle of temporary colostomy has been used have been reported.

#### ELEVENTH SURGICAL PRINCIPLE—USE OF THE INTACT URETER: A 2-STAGE OPERATION

*First stage.* A loop of ureter is isolated and an intact section is embedded down to the submucosa beneath the muscular layers of the bowel. The urine continues to drain into the bladder as usual.

*Second stage.* The lumina of the ureter and bowel are connected.

- By a fulguration tip inserted through the proximal end of the ureter divided just below the point of its egress from the submucosal channel. Ferguson 1931, experimental; Poth, 1935, experimental.
- By insertion of the proximal end of the divided ureter into the lumen of the bowel through an opening made at the point of egress of the ureter from the submucosal channel. Ferguson 1931, experimental; Winsbury White, 1933; Nesbit, 1935.
- By a transfixion suture placed at the first stage. Higgins, 1933.
- By harpin wires looped over and through the ureter. Brenizer 1935.
- By insertion of the end of the ureter by the use of a barb. Palmer, 1936, experimental.

The most recent principle to be developed makes use of the intact ureter which is implanted submucosally without interruption of the urinary

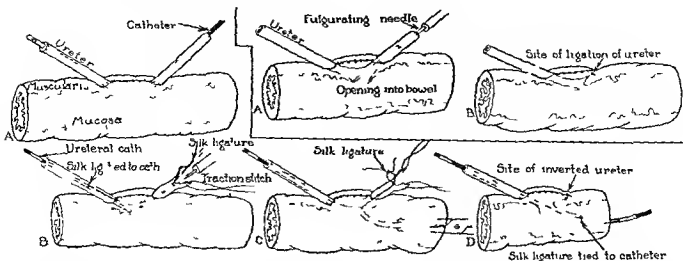


Fig. 31. Lievenh principle. Use of the intact ureter joining the lumina of the ureter and bowel by the fulguration method of C. Ferguson. A, Fulguration needle making an opening through the submucosa and mucosa establishing a fistulous tract between the ureter and the bowel. B, Stump of ureter infolded in wall of bowel with mattress sutures. A, B, C and D, Method of executing operation with the use of a ureteral catheter. A, Short ureteral catheter introduced in submucosally implanted ureter. B, The catheter with a silk ligature attached well above the end is introduced up the ureter beyond the point at which

the opening into the bowel is to be made. The opening between the ureter and the bowel is made with the fulguration needle. C, The distal end of the ureteral catheter is drawn back into the bowel through this fistulous tract by means of the silk ligature and the end is grasped with a clamp introduced through the anus. D, The end of the ureter is invaginated and the point of invagination is closed over with mattress sutures by the silk ligature attached to the catheter when it is withdrawn by the rectal clamp (After Ferguson).

stream. At a second stage the ureters are divided and a communication is established between the lumina of the ureters and bowel. Preparation for this short fistulous tract may have been made at the first operation as by the transfixion suture (Higgins) or the hairpin wire (Brenizer). (The first surgical principle.)

#### 1. BY FULGURATION

Ferguson (U. S. Public Health Service), in 1931, experimenting with cats and cadavers, was the first to use the intact ureter. At the first stage both ureters are implanted in an incision  $1\frac{1}{2}$  in long made in the wall of the sigmoid down to the submucosa. The muscularis is carefully dissected from the submucosa so that it can be re united with mattress sutures over the transplanted ureters without compression. Flaps of peritoneum, raised in order to dissect the ureters from their beds, are used to close over the suture lines in the bowel. Ferguson warned against too great tension and angulation of the ureter.

At the second operation a short fistulous tract (the first principle) is produced with a fulguration electrode (Fig. 31 A, B). The distal portion of the ureter is freed and excised below the point at which it leaves the bowel wall. The distal stump having been ligated near the bladder, the tip of a fulguration electrode is introduced through the

proximal end, and when it reaches the proper point the current is turned on and a hole is cut into the bowel. The mucosa of the ureteral end may be destroyed by fulguration as the tip is withdrawn. Closure is effected by folding the stump into the wall of the bowel with mattress sutures. In cadavers, Ferguson found it easy to introduce short ureteral catheters which he threaded up the ureters and out through the rectum (Fig. 31 A, B, C, D).

Poth, in 1935, using the principle of the intact ureter, proposed the following complicated procedure utilizing a proctoscope and a high-resistance cautery wire. The first stage consists of submucosal implantation of the ureters with the use of a continuous suture of Cushing No. 0 catgut placed in the submucosa for closure. Sufficient tissue is included to approximate 3 mm. of serosa on either side. Kinking and compression of the ureters are prevented by leaving  $\frac{1}{5}$  cm. of submucosa at either end of the trough. No attempt is made to extraperitonealize the implant.

At the second operation three weeks later the ureters are divided at a convenient distance below their emergence from the bowel. A proctoscope is introduced into the rectum until the end is at the distal point of the ureter in the bowel. An opening is made in the ureter 2 cm. from its point of egress from the bowel, and the needle,

attached to an end of the resistance wire, is introduced into the ureter. The edge of the proctoscope being used as a fulcrum, the needle is rotated so as to invert the wall of the gut, the bunched ureter and the needle into the open end of the proctoscope. The point of the needle is thrust through the visceral walls and grasped by an assistant using alligator forceps through the proctoscope. The needle is drawn out until about half the length of resistance wire is pulled through. Another needle at the other end of the resistance wire is thrust through both walls, a short distance above the first and in a similar manner is drawn out through the proctoscope by the assistant. All the slack in the resistance wire having been taken up by the assistant the ends of the wire in the proctoscope are protected with glass shields. When the current is turned on, the non-insulated loop of the wire cuts a fistulous tract through the ureteral and intestinal walls. During the cutting the adjacent wall of the ureter is protected by a ureteral catheter. Cauterization has been found to require as long as fifteen seconds. The wire should be examined subsequently to make certain that it is intact as it may break and fail to form an opening. In order to prevent contamination the ureteral catheters are withdrawn by the assistant through the proctoscope. After establishment of the uretero-intestinal communication and removal of the catheter the distal segment of the ureter is divided close to the bowel and ligated the end buried and the area closed with a single suture in the colon.

#### B. BY INSERTION OF THE END OF THE URETER INTO THE BOWEL

Instead of using the fulgurating tip, Ferguson, in his experimental work on cats in 1931, sometimes found it more convenient to insert the end of the ureter threaded on a probe into the lumen of the bowel through a small puncture made at the end of the submucosal channel.

Winsbury White in 1933, presented his 2 or 3 stage method of using the intact ureter (Fig. 32). At the first operation, one or both ureters are implanted in an incision 1 in. in length made down to the submucosa. The muscular wall is dissected free to permit resuture over the ureters without tension and closure is effected with a continuous catgut suture.

Two weeks later the ureter is divided between clamps about  $\frac{3}{4}$  in. below the distal limit of its union with the bowel. The proximal end is transfixed with a catgut suture and the distal end ligated. Two traction sutures are placed in the wall of the bowel on either side of the lower end

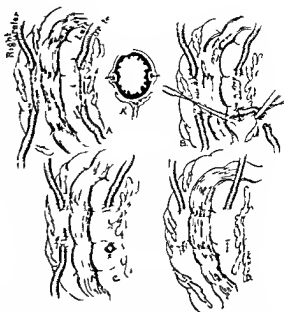


Fig. 32. Eleventh principle. Winsbury White's use of the intact ureter. At the second stage the proximal end of the ureter is implanted into the bowel through a longitudinal incision. A Submucosal implantation of the ureters in the wall of the bowel. A Sectional view. B The ureter is divided  $\frac{3}{4}$  in. below its egress from the submucosal channel at which point a longitudinal incision into the bowel is made. C The end of the ureter is inserted into this opening and fixed in place with an anchoring suture. D Completion of the operation—both ureters transplanted and the incisions in the bowel closed. (After Winsbury White.)

of the implant and an incision  $\frac{1}{2}$  in. long is made longitudinally along the line of the ureter into the lumen of the bowel. The ureter having been dissected free and its lower end split for a distance of  $\frac{1}{4}$  in. it is anchored within the lumen of the gut by the suture previously placed. This suture transfixes the intestinal wall from within outward and brings the end of the ureter below the lower margin of the incision. The incision in the wall of the bowel is repaired with a line of continuous catgut reinforced with Lembert sutures.

In his first case Winsbury White performed the operation in 3 stages. In the first stage he embedded the left ureter, in the second he inserted the left ureter into the bowel and embedded the right, and in the third, he inserted the right ureter into the bowel. He suggests, however, that the operation may be performed in 2 stages with treatment of both ureters at each operation.

Winsbury White reported 1 case, that of a thirteen year-old girl suffering from hypospadias who recovered from a 3 stage operation performed by his method.



Fig 33 Llewellyn principle Nesbit's use of the intact ureter. At the second stage the proximal end of the divided ureter is implanted into the bowel through a stab wound which is closed by a pursestring suture. A First stage Submucosal implantation of the ureters. B, Second stage The ureters are divided 1 in. distal to the area of implantation, a pursestring suture is laid on either side at the point of egress of the ureter from the submucosal channel, and inside of this the wall of the bowel is punctured, as shown on the left side. C The end of the left ureter has been pushed into the bowel through this puncture wound and the end of the right ureter is being introduced similarly. D The left pursestring suture closing in the site of implantation has been tied and the right is about to be tied (After Nesbit)

Nesbit, in 1935, presented his 2-stage method of transplanting the intact ureters (Fig 33). At the first operation both ureters are mobilized for a distance of 10 cm. at the level of the pelvic brim and embedded between the muscularis and serosa of the upper rectum.

At the second operation, performed from fourteen to twenty-one days later, the ureters are divided 1 in. distal to the area of implantation. A pursestring suture is then laid in the intestinal

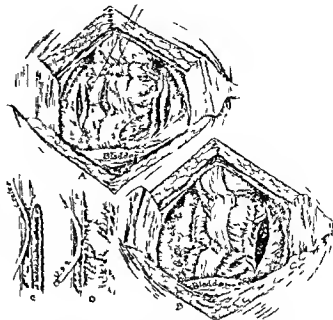


Fig 34 Llewellyn principle Higgins' use of the intact ureter with Coffey's transfixion suture. A, Both ureters have been isolated. The incision of the bowel down to the submucosa has been made on the right and the transfixion suture has been placed ready to tie. B Bilateral implantation of the intact ureters has been completed and the pentoneum has been closed on the right. C, Sectional view showing transfixion suture piercing rectal tube. D Sectional view after the transfixion suture has sloughed out establishing a fistulous tract between the ureter and bowel (After Higgins)

wall around the base of the severed ureter and a puncture wound is made into the lumen of the intestine as closely as possible to the ureteral stump. The anastomosis is completed by inserting the end of the ureter into the lumen of the bowel and tying the purse string suture firmly. Nesbit performed this operation on 2 patients suffering from malignancy. Neither has been followed for a period sufficiently long for evaluation of the end-results.

#### C BY A TRANSFIXION SUTURE

Higgins, in September, 1933, described a method which combines the transfixion suture of Coffey with the principle of the intact ureter (Fig 34). In the first stage, an incision 6.5 cm. in length is made in the rectosigmoid down to the mucosa. The ureter having been placed in the trough, a transfixion suture of silk is placed first through the wall of the ureter, piercing its lumen, and then through the exposed submucosal mucosal layer of the rectal wall and tightly tied. It may be anchored on a rectal tube or on a ring as proposed by Coffey. Higgins states that in order

to obviate the formation of a blind pouch when the ureter is severed at the second stage it is essential to place the suture at the distal end of the incision (Ferguson prevented this complication by destroying the mucosa of the ureter by fulguration.) The muscular and serous layers are reapproximated over the ureter with interrupted silk sutures. Finally, the site of implantation is extraperitonealized with a flap of posterior parietal peritoneum.

At the second operation, the ureters are isolated divided, and ligated as closely as possible to their point of emergence from the distal angle of the incision and the end is buried in the wall of the bowel.

#### D BY HAIRPIN WIRES LOOPED OVER AND THROUGH THE URETER

Brenner in 1935, developed a technique of submucosal implantation of the intact ureters by which a communication between the ureters and bowel could be established later without an additional abdominal operation (Fig. 35).

A rectal tube is inserted and a transperitoneal exposure made. Both ureters are isolated without division and the 2 longitudinal incisions are made in the rectosigmoid through the serosa and muscularis down to the submucosa as in all first stage operations by the eleventh principle. Two lengths of tonsil wire, bent in the shape of long hairpins, are placed one just above the other. The longer is designated as the 'loop,' and the shorter, as the 'transfixion wire.' The right ureter is laid in its submucosal channel and an end of the loop wire is passed on each side of it through the submucosa and mucosa at the distal end of the incision into the open end of the rectal tube, in which the 2 ends of the wire are seized by an assistant who draws them on and out together until the loop engages the ureter. These are the longer 'loop wires.' The end of another piece of wire is made to pierce the wall of the ureter just above the level of this loop wire and is passed a short distance up the lumen of the ureter and then out through the wall again. The 2 ends of this transfixion wire are passed through the submucosal mucosal layer into the open end of the rectal tube and are drawn out together by an assistant until the wire engages the wall of the ureter.

The rectal tube is then removed and re-introduced alongside the 4 wires and the same procedure is carried out upon the left ureter. The muscularis and serosa are closed over the ureters. The lower ends of the loop and transfixion wires of the right and left sides are bent by an assistant

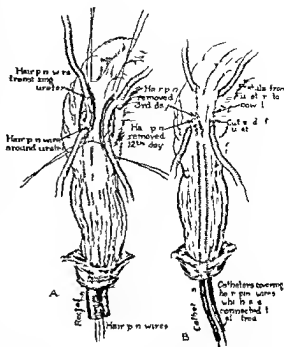


Fig. 35. Eleventh principle. Hairpin wire method of Brenner. A. Relationship of hairpin wires to ureter in its submucosal course. Wires passing through submucosa and mucosa and out rectal tube. B. Anastomosis completed. Serosa and muscularis closed over ureter. Hairpin wires in place on right. Following removal on left.

for identification and attached to slight elastic traction.

After three days, with the aid of a proctoscope a small rectal tube is passed over the 4 transfixion wires as insulation and the right and left wires are touched in succession with an electrocoagulation electrode to cause them to cut through, thus forming a short fistulous tract between the ureter and the bowel (first surgical principle).

After twelve days, gentle traction is applied to the loop wires in an attempt to draw the ureter down so that, when cut, the ends of the ureter will project into the lumen of the bowel. To do this a weak electric current is passed through first the right loop and then the left loop so as to cut slowly through the ureters and rectal submucosa and mucosa, coagulating the contiguous tissues. The method was successful in one clinical case.

#### E INSERTION OF THE END OF THE URETER BY THE USE OF A BARB

Palmer in 1936,<sup>1</sup> experimenting on dogs, developed a method whereby the end of the submucosally implanted ureter is introduced aseptically

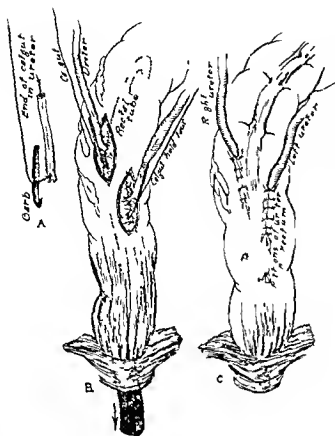


Fig. 36 Ninth (and eleventh) principle. Submucosal implantation of ureter by method of Palmer with use of a barb. A End of divided ureter attached to barb. Short end of catgut threaded up ureter as urine guide. B Rectal tube in place, incisions made down to submucosa. Barbs with ureters attached piercing submucosa, mucosa and rectal tube. C Rectal tube withdrawn bringing ends of ureters within bowel. Serosa and muscularis closed over submucosally implanted ureters. Note. This illustration shows the operation being performed with use of the ninth principle alone, a method which Palmer recommends as well as with the intact ureter. The end of the ureter is treated in an identical manner in both operations.

tically into the lumen of the bowel at a second stage operation (Fig. 36). At the first stage the ureters are implanted submucosally as usual. About two weeks later the site of implantation is exposed and the distal portion of the ureter dissected free to about the mid portion of its submucosal course. It is divided about 5 cm farther down. The end is then split for a distance of about 1 cm and one corner of the divided end is ligated with a suture of No. 1 plain catgut. The short end of this suture is inserted up the ureter, as advised by Mayo, for a urine guide. The long end is threaded through a barb which is used to pierce the mucosa and submucosa of the bowel. There are right and left barbs, one for each ureter, which are made with longitudinal grooves along

the side for reception of the ureter. The ureter having been pulled down snugly into the groove of the barb by traction made on the long end of catgut, the blunt end of the barb is grasped firmly with a needle carrier and the barbed sharp end thrust through the submucosa and mucosa of the bowel into the wall of a rectal tube which has been previously introduced through the anus. Upon withdrawal of the rectal tube, the barb catches in the rubber wall of the tube and is pulled into the lumen of the bowel, carrying the end of the ureter with it. The long end of catgut being kept taut, sutures are then placed through the serosa and muscularis of the bowel to close the site of implantation completely. The long end of catgut, traction on which has held the end of the ureter in the barb, is dropped, the excess is cut off, and as the rectal tube is withdrawn it disappears into the bowel.

The identical procedure is carried out on the opposite ureter with the use of the other barb.

Palmer recommends that the operation be performed also in 1 stage with use of the ninth principle alone.

#### SUMMARY OF CASES

Methods utilizing the principle of the intact ureter with a transfixion suture are of such recent origin that very few case reports are available. Higgins, in one of his reports in 1935, mentions knowing of 53 patients operated on by various surgeons according to his technique with only 4 deaths. There are no available reports which will permit a statistical analysis of complications, causes of death, or late results.

#### DISCUSSION

As Ferguson originally pointed out, the submucosal implantation of the intact ureter with postponement of urinary diversion to a second operation permits aseptic healing of the ureter in its new channel in the wall of the bowel. Cut surfaces are not exposed to contamination with urine and feces. The advantages of the method are reduction of the danger of leakage at the site of anastomosis, elimination of the evils of obstruction from the surgical edema during the period of healing, and lessening of the opportunity for the development of ascending urinary infection by the postponement of exposure of the lymphatics, blood vessels, tissue spaces, and lumen of the lower ureter to contamination until after the initial wound has healed. Winsbury White also suggests that the procedure more adequately preserves the vitality of the lower ureter at the site of implant, thus lessening the possibility of gangrene which might arise from a poor blood supply.



to obviate the formation of a blind pouch when the ureter is severed at the second stage it is essential to place the suture at the distal end of the incision (Ferguson prevented this complication by destroying the mucosa of the ureter by fulguration.) The muscular and serous layers are approximated over the ureter with interrupted silk sutures. Finally the site of implantation is extraperitonealized with a flap of posterior parietal peritoneum.

At the second operation the ureters are isolated, divided, and ligated as closely as possible to their point of emergence from the distal angle of the incision and the end is buried in the wall of the bowel.

#### D BY HAIRPIN WIRES LOOPED OVER AND THROUGH THE URETER

Brenizer in 1935 developed a technique of submucosal implantation of the intact ureters by which a communication between the ureters and bowel could be established later without an additional abdominal operation (Fig. 35).

A rectal tube is inserted and a transperitoneal exposure made. Both ureters are isolated without division and the 2 longitudinal incisions are made in the rectosigmoid through the serosa and muscularis down to the submucosa as in all first stage operations by the eleventh principle. Two lengths of tonsil wire, bent in the shape of long hairpins, are placed one just above the other. The longer is designated as the loop, and the shorter, as the transfixion wire. The right ureter is laid in its submucosal channel and an end of the loop wire is passed on each side of it through the submucosa and mucosa at the distal end of the incision into the open end of the rectal tube in which the 2 ends of the wire are seized by an assistant who draws them on and out together until the loop engages the ureter. These are the longer loop wires. The end of another piece of wire is made to pierce the wall of the ureter just above the level of this loop wire and is passed a short distance up the lumen of the ureter and then out through the wall again. The 2 ends of this transfixion wire are passed through the submucosal mucosal layer into the open end of the rectal tube and are drawn out together by an assistant until the wire engages the wall of the ureter.

The rectal tube is then removed and re introduced alongside the 4 wires and the same procedure is carried out upon the left ureter. The muscularis and serosa are closed over the ureters. The lower ends of the loop and transfixion wires of the right and left sides are bent by an assistant

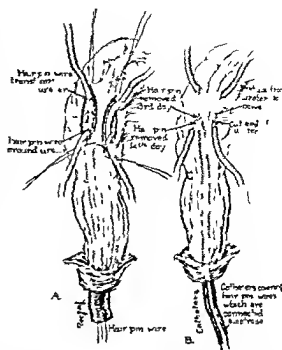


Fig. 35. Eleventh principle. Hairpin wire method of Brenizer. A Relation of hairpin wires to ureter in its submucosal course. Wires pass through submucosa of mucosa and out rectal tube. B Anastomosis completed. Serosa and muscularis closed over ureters. Hairpin wires in place on right following removal on left.

for identification and attached to slight elastic traction.

After three days with the aid of a proctoscope a small rectal tube is passed over the 4 transfixion wires as insulation and the right and left wires are touched in succession with an electrocoagulation electrode to cause them to cut through the tissue forming a short fistulous tract between the ureter and the bowel (first surgical principle).

After twelve days, gentle traction is applied to the loop wires in an attempt to draw the ureter down so that when cut, the ends of the ureter will project into the lumen of the bowel. To do this a weak electric current is passed through first the right loop and then the left loop so as to cut slowly through the ureters and rectal submucosa and mucosa, coagulating the contiguous tissues. The method was successful in one clinical case.

#### F INSERTION OF THE END OF THE URETER BY THE USE OF A BARB

Palmer, in 1936,<sup>1</sup> experimenting on dogs developed a method whereby the end of the submucosally implanted ureter is introduced aseptically

TABLE XI—SURGICAL MORTALITY IN 740 CASES OF URETERO INTESTINAL ANASTOMOSIS

Surgical principle	I Congenital anomalies and trauma			II Vesical infection (ulcer)			III Malignancy			IV Diagnosis not stated			Total		
	Cases	Deaths	Mortality per cent	Cases	Deaths	Mortality per cent	Cases	Deaths	Mortality per cent	Cases	Deaths	Mortality per cent	Cases	Deaths	Mortality per cent
1. Fistulous tract	7	1	14.3	1	0	0	5	3	60.0	1	0	0	16	4	25.0
2. Direct insertion	17	3	17.6	5	1	20.0	12	9	75.0	2	2	100.0	37	16	43.2
3. Muscularizing principle	89	11	12.4	3	1	33.3	44	20	45.4				136	32	23.5
4. Preservation of the ureteral orifice	25	43	23.4	3	1	33.3	4	1	25.0	31	17	54.8	143	61	42.6
5. Temporary diversion of the urine	(Analyzed under another principle used in conjunction)														
6. Internal flap of bowel	2	1	50.0				1	1	100.0	1	1	100.0	4	3	75.0
7. Mechanical devices	3	0	0	1	1	100.0	3	6	75.0				13	7	54.0
8. Insertion in a natural duct	5	2	40.0	1	0	0	3	3	100.0	1	1	100.0	10	6	60.0
9. Submucosal	124	19	15.3	19	3	15.8	110	53	48.2	6	3	50.0	259	75	29.0
10. Temporary diversion of the fecal stream	(No clinical reports)														
11. Intact ureter	(Reports too incomplete to analyze)														
12. Unclassified	3	1	33.3	5	1	20.0	13	7	53.8	3	1	33.3	24	10	41.7
TOTAL	452	91	20.1	35	9	25.7	203	103	50.7	4	25	62.5	740	220	29.7

diagnosis was not stated. In the first group the surgical mortality by all methods was 20 per cent, in the second, over 50 per cent. Many of the deaths of patients with malignancy followed the second stage of surgery for removal of the cancer (cystectomy, prostatectomy, etc.).

Three surgical principles have been used widely, the others in relatively few cases. The muscularizing principle (third) has been applied in 136 cases, with a surgical mortality of 27.9 per cent, the preservation of the ureteral orifices (fourth principle) in 243, with a surgical mortality of 27.6 per cent, and the submucosal principle (ninth) in 259, with a surgical mortality of 30.1 per cent.

When the cases are separated into 2 groups—those of benign and those of malignant lesions—the surgical mortalities are found to have been respectively

Principle	Benign		Malignant	
	Cases	Mortality per cent	Cases	Mortality per cent
Submucosal	143	15.5	110	48.2
Muscularizing	92	19.5	44	45.4
Maydl	243	27.6	Not applicable	

The common complications of uretero-intestinal implantations follow intestinal and urinary infections and obstructions. These may become serious immediately following the operation or may not be troublesome for months or years.

The reports are too incomplete for determination of the late results achieved by the operations as a whole or of those achieved by any particular principle or technique. Occasionally ureters have been implanted successfully by each of the 11 principles except the sixth and the tenth.

Early complications were numerous although undoubtedly they were reported incompletely. Peritonitis occurred in 82 patients (22 of 136 operated on by the muscularizing principle, 24 of 178 operated on by the Maydl principle, and 22 of 259 operated on by the submucosal principle). Intestinal obstruction occurred in 24 (in none operated upon by the Maydl principle, in 4 operated on by the muscularizing principle, in 18 operated on by the submucosal principle, and in only 2 operated on by the other principles). These statistics are obviously unreliable except possibly those for the submucosal principle.

Ureteral and fecal fistulas or both occurred in 72 of the 740 patients (5 operated on by the muscularizing principle, 17 operated on by the Maydl principle, and 20 operated on by the submucosal principle).

Two hundred and twelve (28.6 per cent) of the 740 patients had early renal infections (49 of 136 operated on by the muscularizing principle, 43 of 178 operated on by the Maydl principle, and 73 of 259 operated on by the submucosal principle). Ureteral obstruction was reported as a complica-

TABLE XII—SUMMARY OF INCIDENCE OF COMPLICATIONS IN 740 CASES OF URETERO-INTESTINAL ANASTOMOSIS

Number of cases	1 The formation of a fistulous tract			2 Direct			3 Muscular retraction			4 Preservation of ureterovesical orifice			5 Flap principle			6 Mechanical devices			7 Subcutaneous			8 Miscellaneous			Total												
	(a)		(c) (1)	(c) (2)		(136)	(578)		(4)	(13)		(10)	(11)		(12)	(13)		(14)	(15)		(16)	(17)		(18)													
	No	Yes		No	Per cent		No	Per cent		No	Per cent		No	Per cent		No	Per cent		No	Per cent		No	Per cent			No	Per cent	No	Per cent								
Renal infection	1	50	2	18	1	31	8	16	49	16	43	24	22	35	8	1	10	28	30	7	2	0	43	10	4	1	30	0	3	15	0	113	28	6			
Ureteral obstruction	1	50	1	18	1	31	5	13	5	8	5	9	4	5	1	7	7	2	10	0	2	2	1	13	6	15	10	3	5	10	0	54	7	3			
Peritonitis	1	50	1	0	1	33	2	5	4	21	16	7	4	12	5	3	4	6	2	15	4	2	20	0	5	5	5	1	18	3	83	11	1				
Intestinal obstruction							3	5	4	2	9								7	7	7			11	7	5				24	3	3					
Fistulas (ureinary fecal or both)				2	18	1	31	5	13	5	3	6	17	9	14	21	5		2	15	4	1	10	0	6	6	4	18	1	10	6	5	50	0	73	0	7
Pneumonia							1	2	4	2	9	0	5	0	1	1	5			1	10	0	7	7		5	3	4				18	3	8			
Shock							1	2	1	1	3	7	1	1	1	1	5			2	2	1				7	4	8				1	3	10	2	6	
Wound infection				1	33	3	5	4	2	9	1	6	1	4	6				4	4	4				2	1	3				17	2	3				
Urinary calculus				1	50			1	1	5	3	7	1	1	5										4	2	7				11	1	5				
Wound disruption							4	2	9										2	2	1										8	1	1				
Cardiac failure							2	1	5	1	6								1	1	1										3	10	6	0	3		
Septicemia							1	0	7	2	1																					10	66	6	0	3	
Plethoric				1	2	7		2	7																							4	0	5			
Cutis							1	2	7																								4	0	5		
Pulmonary embolus																																					
Pyelitis							1	0	7	1	6																										
Bowel hemorrhage							1	0	7	1	6																										
Septic dermatitis							1	0	7																												
Status lymphaticus																																					
Scarlatina																																					
Meningitis																																					
Influenza																																					
Massive collapse of lung																																					
Empyema							1	0	7																												
Pyuria																																					
Bladder atony																																					

The cases in which the principle of temporary diversion of the urine (Principle 1) was applied have been audited under this principle with which Principle 2 was combined. The data reported for this method of the intact ureter (Principle 1) are not included in the total.

Subheads refer to methods as follows:

a. The formation of a fistulous tract. b. By use of a long suture connection to bowel (Sowab). c. The transference of a ureter with subcutaneous implantation (Coffey's method). d. The transference of a ureter with subcutaneous implantation (Coffey's method). e. The transference of a ureter with subcutaneous implantation (Coffey's method). f. The transference of a ureter with subcutaneous implantation (Coffey's method). g. The transference of a ureter with subcutaneous implantation (Coffey's method). h. The transference of a ureter with subcutaneous implantation (Coffey's method). i. The transference of a ureter with subcutaneous implantation (Coffey's method). j. The transference of a ureter with subcutaneous implantation (Coffey's method). k. The transference of a ureter with subcutaneous implantation (Coffey's method). l. The transference of a ureter with subcutaneous implantation (Coffey's method). m. The transference of a ureter with subcutaneous implantation (Coffey's method). n. The transference of a ureter with subcutaneous implantation (Coffey's method). o. The transference of a ureter with subcutaneous implantation (Coffey's method). p. The transference of a ureter with subcutaneous implantation (Coffey's method). q. The transference of a ureter with subcutaneous implantation (Coffey's method). r. The transference of a ureter with subcutaneous implantation (Coffey's method). s. The transference of a ureter with subcutaneous implantation (Coffey's method). t. The transference of a ureter with subcutaneous implantation (Coffey's method). u. The transference of a ureter with subcutaneous implantation (Coffey's method). v. The transference of a ureter with subcutaneous implantation (Coffey's method). w. The transference of a ureter with subcutaneous implantation (Coffey's method). x. The transference of a ureter with subcutaneous implantation (Coffey's method). y. The transference of a ureter with subcutaneous implantation (Coffey's method). z. The transference of a ureter with subcutaneous implantation (Coffey's method).

tion in only 54 of the 740 patients (8 operated on by the muscularizing principle, 8 operated on by the Maydl principle, and 20 operated on by the submucosal principle)

#### GENERAL DISCUSSION

A study of the literature on uretero-intestinal implantation such as that just summarized leaves one with a feeling of disappointment at the lack of improvement with the advent of newer methods and greater experience. It would seem that every surgical principle imaginable has been tried. Of the 11 principles listed, the submucosal principle has a distinct advantage in theory and has shown the best results in practice. Nearly all modern techniques make use of it either as the primary or secondary principle. Even the newest methods which utilize the intact ureter (eleventh principle) for asepsis are primarily submucosal. The problem of the formation of an opening between the ureter and the bowel at the second stage of the operation by methods based on the eleventh principle has not been solved satisfactorily. The final test of a successful implantation is not only recovery from the operation, but survival with normal ureters and kidneys. A lateral opening is unsatisfactory because of its tendency to constrict and produce obstruction. In practice, the advantage gained by healing of the ureter in its intestinal channel under conditions of asepsis is offset by the difficulties of establishing a full opening afterward. Simpler 1 stage methods which give an orifice at the end of the ureter may prove superior.

In addition to these elementary principles of surgery representing the 11 major differences in technique, several conditions must be recognized as common to all techniques, no matter how elementary or compound. These are the basic principles of intestinal and ureteral surgery and must be fulfilled by any method. What produces localized necrosis of the intestine or perforation and tearing out of sutures, the common causes of postoperative leakage and peritonitis? What produces the constriction which leads to intestinal obstruction? Why is anemic infarction, extensive necrosis, diffuse ureteritis, or marked dilatation of the ureter found at necropsy? Too often the answer is—failure to follow the simple well-known rules of intestinal and ureteral surgery. The only layers which are safe for suturing are the submucosal layer of the bowel and the adventitia of the ureter. Sutures cannot penetrate the lumen of either without danger. Their blood

supply cannot be disturbed to any great extent. Neither of them can be unduly traumatized, twisted, or displaced. These are some of the basic principles that must be followed.

The marked difference between the risk of implantation for exstrophy (less than 15 per cent) and for cancer (almost 50 per cent) arises partly from differences in the age period but mostly from the added risk of the surgery for the malignant condition. Statistics show, also, that implantations in 2 stages (1 ureter at each), as done for most exstrophies, are safer than simultaneous bilateral implantations. The latter is the usual method used in malignancies because of the necessity for a second operation to remove the cancer. Perfection of the principle of the intact ureter to a 1-stage operation, or the development of any safe procedure in 1 stage will lower the mortality of cystectomy for malignancy. Until such a procedure is developed, the implantation of the second ureter at the time of cystectomy is the safest plan.

The theoretical advantage of extraperitoneal operations has not proved to be practical. Peritonitis results from leakage after the operation and not from contamination at the time of operation. When sutures are placed properly, leakage does not occur. The little protection against it gained by extraperitoneal exposure is more than offset by the increased difficulty of implanting the ureter untwisted, unlinked and unobstructed.

Finally, it appears from this study that the problem remains unsolved. In making this admission, one must recognize that the problem involved is not solely one of surgical technique. There is the unknown, indeterminate, but ever present factor of urinary sepsis. Susceptibility to infection varies with individuals as does the conjunction at operation of accessory and other factors which favor it. Often varying degrees of pyelonephritis and infected hydronephrosis are already present, and experience shows that such conditions are rather favorable than otherwise when they have led to a well-established immunity. Whether the tract above is clean or not, there is the chance that an acute infection will ascend from the bowel to the kidneys as soon as a communication is established. The surgeon who knows the individualistic, technical, and bacteriological factors of success and failure is in a position to reduce the uncertainty of the operation to the minimum. The success of the future may lie along lines of immunity as much as those of technique.

# ABSTRACTS OF CURRENT LITERATURE

## SURGERY OF THE HEAD AND NECK

### HEAD

Axhausen G and Hammer H Tumors of the Jaws (Die Geschwulste der Kieferknochen) *Zentralbl f Chir* 1936 pp 1124 1174

This article is a discussion of tumors of the jaws in the light of the findings of the most recent investigations

### NON SPECIFIC GRANULATION TUMORS

In contrast to the proliferations of wound granulations (granulation hyperplasias), which are due to mild disturbances of the self regulation of the organism in wound healing in granulation tumors this self regulation is entirely lacking. In the latter cell division has assumed a form which is regarded as a sign of true tumor formation: an uncontrolled cell division recurrence. Such tumors are especially frequent in the jaws. When the tissue character of the initial granulation is preserved, the neoplasm is the rare pure granulation tumor, the granuloma simplex.

More frequently there are tissue changes. When the predominant tendency is toward the formation of collagenous connective, the tumor is a fibrous granulation tumor, the fibrogranuloma. When the change involves the vascular system with the formation of predominant endothelial tubes and giant cells (the intermediate stage of vessel formation) the tumor is a giant cell tumor, the granuloma gigantocellulare. Less frequently the change involves the mesenchymal basal cells. When this occurs the neoplasm is a sarcoma like granuloma, the granuloma sarcomatodes.

The site of these various types of non specific granulation tumors may be at the periphery of the jaw (epulis) or central. On this fact is based the following schema:

1 Granulation tumors with unchanged tissue structure (a) epulis granulomatosa, (2) central granuloma

2 Granulation tumors with connective tissue maturation and a fibrous tissue structure (a) epulis fibrosa (b) central fibrogranuloma

3 Granulation tumors with predominant proliferation of the blood vessels and the formation of incomplete vascular buddings (giant cells) (a) epulis gigantocellulare (b) central giant-cell tumor

4 Granulation tumors with predominant proliferation of the mesenchymal basal cells (a) epulis sarcomatodes (b) central granuloma sarcomatodes

The authors describe the clinical characteristics of these tumors in detail. They emphasize that the spread of the central giant-cell granuloma does not follow the laws of truly benign tumors. They call

attention to the fact that the epulis sarcomatodes may be easily confused with carcinoma of the mucous membrane of the alveolar process and to the clinical similarity of the central granuloma sarcomatodes to true sarcoma (quick growth, complete bone destruction).

In the treatment, irradiation is the method of choice for the pure and the sarcoma like granulomas. In cases of fibrogranuloma and giant-cell granulomas irradiation is useless and operation is indicated. Radical operation is especially necessary for central tumors of these types. In the treatment of all types of such tumors cooperation of the dentist is essential.

### TRUE TUMORS

1 Tumors of the supporting tissue. Fibromas are more frequent than osteofibromas or calcified fibromas. The occurrence of true central fibromas has now been proved. These develop in the middle portion of the ramus of the lower jaw and always grow toward the face.

In discussing osteomas the authors take up in special detail the differentiation of these tumors from the osteodystrophia fibrosa of Paget. To the few maxillomas which have been recorded they add a tumor of this type which came under their own observation. True chondromas arising from rests of Meckel's cartilage are also uncommon. They must be differentiated from the very malignant "false chondrosarcoma". The old classification of true sarcomas into the peripheral (periosteal and central) and myelogenous forms should be abandoned. In support of this opinion the authors cite Hellner who distinguishes the following 3 forms: (1) osteogenic sarcoma arising from bone forming germinal tissue and forming intercellular substance; (2) Ewing's sarcoma which forms no intercellular substance and presents the picture of the undifferentiated alveolar sarcoma, and (3) still unclassified sarcomas (very rare).

The authors describe the clinical characteristics of these tumors and report a case of chromatophoroma (melanosarcoma).

2 Ectodermal tumors. The authors report a case of epithelial cyst of the jaw of a rare type for which they suggest the term epidermoid or dermoid cyst and which is to be regarded as the basis of the very rare cholesteatoma of the jaw. They reject the theory that the origin of this tumor is an inflammation or a primary dental cyst.

They discuss carcinoma. Carcinoma is very seldom primary in the jaw (Orth, Partsch, the authors). As a rule it involves the jaw secondarily from the covering mucous membrane.

The authors discuss the treatment indicated for the true tumors. It is radical operation with post operative irradiation. The cooperation of the dentist and prosthetic work are necessary before and after the operation. In resection of the upper jaw continuation of the incision at the margin of the nose along the lower edge of the orbit is unnecessary and is to be rejected because it endangers the cosmetic result. The authors describe a special operative technique—an enlarged radical operation on the lower jaw.

#### TUMORS ARISING FROM THE VASCULAR SYSTEM

1. **Radicular cysts.** Radicular cysts arise on the basis of a chronic inflammation, pulp necrosis and destruction. "In the absence of teeth with dead pulp there will be no radicular cyst." In contrast to previous theories regarding the origin of the cavities lined with epithelium, only one type of development has been demonstrated. "These cavities are formed from preformed cavities of the granulation tissue from small chronic abscesses" (Grawitz, Weski, Hammer).

Differentiation of large cysts of the nasopalatine duct is necessary.

2. **Follicular cysts.** The classical theory of the origin of follicular cysts (cystic degeneration of the tooth germ) is still regarded as correct for those in which the tooth crown protrudes naked into the cyst cavity. For those in which the cyst capsule covers the penetrating tooth crown the etiological theory of Bloch-Joergensen and others, that such cysts are radicular milk tooth cysts, is recognized.

The treatment of choice for large cysts is removal of the entire anterior wall of the cyst followed by tamponade and in the upper jaw, possibly wide opening to the nose.

3. **Adamantinomas.** Adamantinomas occur in cystic and (more rarely) solid forms. The authors describe their histological and clinical characteristics in detail. They emphasize that, like the growth of the central giant cell tumors, the growth of these neoplasms is not absolutely benign. They describe in detail the histological differentiation of adamantinomas from simple cysts (biopsy), which is of importance from the point of view of treatment. In many cases radical operation is necessary.

4. **Odontomas.** Odontomas are tumors forming a hard substance which arise from both parts of the tooth anlage. There are partial, or dependent, and independent forms. Among these are distinguished soft (adamantinoma like) and hard odontomas. The simple forms of the latter are "tumorous changed tooth anlagen." The mixed forms are made up of various hard substances.

(WELCKER) ROBERT H. IVY, M.D.

Major, S. G. Giant Cell Tumors of the Jaw.  
*Ann. Surg.*, 1936, 104: 1068.

After presenting a detailed discussion of the etiology, pathology, diagnosis, and treatment of benign giant cell tumors, in which he cites the

opinions of numerous writers on these subjects, Major reports 3 cases of involvement of the jaw bones by such tumors which came under his observation. His conclusions are as follows:

1. No adequate explanation for the histogenesis of giant cell tumors has been given.

2. Certainly some, and probably all, of the growths are neoplastic.

3. In a large percentage of cases the lesion should be diagnosed from clinical and roentgen data. In doubtful cases it should be considered in the differential diagnosis.

4. A biopsy specimen should always be taken, preferably with the high frequency current, prior to the removal of such a neoplasm. The tumor should be treated conservatively by curettage followed by either chemical or thermal (high frequency) cauterization of the tumor area.

5. For cases of suspected giant cell tumors roentgen irradiation should not be advocated to the exclusion of surgery since in some cases the condition cannot be definitely differentiated from malignancy. The patient should receive the benefit of biopsy, and if malignancy is found the involved jaw should be resected. If roentgen therapy alone is used, a certain percentage of patients with doubtful tumors will succumb to malignancy which surgery could have averted.

6. Postoperative roentgen irradiation should be advocated for all cases. ROBERT H. IVY, M.D.

#### EYE

Bruck, A. J. Deposits of Fat in Trachomatous Pannus. *Arch. Ophthalm.*, 1936, 16: 930.

The author describes a type of central corneal opacity occurring as a complication of trachomatous pannus, which was first mentioned by Fuchs. The lesions begin slightly below the center of the cornea in the form of small discrete spots beneath Bowman's membrane. The spots increase in number and invade the deeper layers of the cornea without becoming confluent. Histological studies have shown the granules to be composed of fat and hyaline material.

Several cases in which a corneal transplant was successfully done for this condition are reported in detail. SAMUEL A. DURE, M.D.

Martin, H. E., and Reese, A. B. The Treatment of Retinal Glomias by the Fractionated or Divided Dose Principle of Roentgen Radiation. A Preliminary Report. *Arch. Ophthalm.*, 1936, 16: 733.

After reviewing in considerable detail previously reported cases of gloma in which irradiation was used, the authors describe their technique of irradiating from several points in order to cross fire the growth. They then report 6 cases of retinal gloma in which their technique was employed. In each of the latter the treatment extended over several months. Three of the patients—2 of which have been under observation for three years—are now

free from disease and have vision ranging from 20/40 to 10/25. Of the 3 others 1 has had a recurrent and 2 have glaucoma which is now being treated.

SAMUEL A. DEER, M.D.

### EAR

Luescher E. Otomicroscopy in the Living. *J Laryngol & Otol* 1936 51 779

The author states that by strong magnification a clearer and more characteristic picture is obtained than by ordinary otoscopy. What for the ordinary lens is at the limit of visibility attains considerable size and becomes quite unmistakable. The control of the ordinary otoscopic pictures with the ear microscope shows that deceptions are not so rare as is generally believed. In some cases only a strong magnification will prevent important diagnostic mistakes. Moreover the ear microscope brings to attention a good many details which cannot be seen by ordinary otoscopy and are known if at all only from studies of histological preparations. In spite of the fact that otomicroscopy is still in the early stages of its development considerable progress has been made in its use and it has already proved of aid in the solution of many difficult problems of differential diagnosis.

JAMES C. BRASWELL, M.D.

### NOSE AND SINUSES

Faltin R. A Typical Procedure for Reconstruction of the Tip of the Nose, the Septum and the Medial Part of the Ala Nasi. (Ein typische Verfahren zum Ersatz der Nasenspitze, des Septums und der medialen Teile der Nasenfluegel). *Acta chirurg Scand* 1936 18 492

The author has often observed a typical deformity after lupus of the nose. The tip of the nose, the medial parts of the alae and the septum are missing; the nostrils are more or less stenosed and the remaining portions of the alae are drawn up by the cicatrices. He describes a procedure which he has developed for the treatment of such deformities. In this method a transverse incision is made first to permit drawing down the remains of the alae with their borders so that they may be used in the construction of the new nose, these structures being impossible or very difficult to imitate in a satisfactory manner by other means. Additional tissue for the rhinoplasty is obtained in the form of a tubed pedicle flap from the neck or the arm. The nose is given its permanent shape by several small operations: excision of superfluous subcutaneous fat, the introduction of moulding mattress sutures and the implantation of small pieces of cartilage for the tip of the nose and the septum. It is often of advantage as an intermediate step to suture the pedicle of the flap at the border of the lower jaw to insure good circulation while the moulding operations are being done.

The use of a tubed pedicle is of advantage as the patient is thereby spared the presence near his face

of disagreeable suppurating surfaces, and the cylindrical form of the flap lends itself very well to the reconstruction of the new nose.

The author reports 3 cases in which the described method was used.

ROBERT H. IVY, M.D.

### MOUTH

Bercher J, Godville F and Ruppe C. Adamantinomas (Les Adamantinomes). *Presse med* Par 1936 10 92 1809

The authors divide adamantinomas into 2 types: (1) the adamantine epithelioma of unlimited growth which is the tumor generally called adamantinoma and (2) the adamantinoma of limited growth which is characterized by the presence of calcified masses of tooth structure and is generally regarded as an odontoma.

The tumor of the first type is usually a polycystic neoplasm and occurs as a rule in the region of the angle of the mandible. It grows slowly and progressively without pain and may acquire a considerable size. It is not accompanied by enlargement of the lymph nodes and it does not metastasize. On the other hand it shows a remarkable propensity to recur locally. Malignant degeneration is rare.

The authors present a detailed discussion of the pathological anatomy, clinical signs and roentgen appearance of the various forms.

ROBERT H. IVY, M.D.

### PHARYNX

Richards L. Retropharyngeal Abscess. *New Eng J Med* 1936 215 110

Richards calls attention to the fact that retropharyngeal abscess, though commonly regarded as without much special surgical risk, has an average mortality of 7.4 per cent.

Only constant consideration of retropharyngeal abscess as the possible cause of a wide range of symptoms will prevent diagnostic error.

Careful digital palpation of the pharyngeal wall is preferable to the use of a tongue depressor or mouth gag.

Pharyngeal incision without anesthesia and with the patient in the prone position will suffice to secure drainage in almost all cases.

Sudden severe hemorrhage must be controlled at once by carotid ligation.

JAMES C. BRASWELL, M.D.

Juul J and Strandberg O. Roentgen Treatment of Carcinoma of the Hypopharynx (Roentgenbehandlung der Hypopharynxcarcinome). *Strahlentherapie* 1936 56 59

Of 32 patients with carcinoma of the hypopharynx who were treated by roentgen irradiation, 14 have remained free from symptoms, 5 developed a recurrence after from six to twelve months, 10 showed improvement for several months and 3 showed no

improvement whatever. Altogether 49 patients were treated, but 4 were not subjected to irradiation as their condition was hopeless, and 13 did not receive adequate irradiation treatment.

It appears that there are cases in which irradiation cures the condition easily and others in which it is seldom successful. The results are better in cases of cauliflower like tumors not infiltrating the surrounding structures than in those of less prominent tumors with an infiltrating growth. The glands do not appear to influence the prognosis. Glands which have not been treated surgically are affected by irradiation more favorably than glands upon which an operation has been performed.

In the reviewed cases the treatment consisted of prolonged roentgen irradiation with fractionated doses. The factors were a voltage of from 165 to 280 kv., a current of from 2 to 4 ma., a copper and tin filter (Thoraeus), a half value layer of copper of 1.5 mm., a skin focus distance of from 50 to 70 cm., an intensity of from 2.5 to 5 r per minute, and a field measuring 48 to 150 sq. cm. Two treatments were given each day. The treatment extended over a period from six to eight weeks, and the total dosage was approximately 7,000 r. An exudative skin reaction occurred very seldom. The majority of the patients had a confluent epithelitis. Histologically, most of the tumors were squamous cell carcinomas of the mucous membrane type.

The treatment should be directed toward the production of a mild confluent epithelitis or a reaction just bordering on that condition. Intensive treatment extending over a period of from three to four weeks, causing a marked skin and mucous membrane reaction, should be employed only in very exceptional cases.

(VORSCHUETZ) WILLIAM C. BECK, M.D.

## NECK

Lahey, F. H. Stage Operations in Severe Hyperthyroidism. *Ann. Surg.* 1936, 104, 961.

From his experience in 14,600 operations for goiter the author concludes that in cases of severe hyperthyroidism the mortality is lowered when subtotal thyroidectomy is performed in stages.

The administration of iodine in the form of Lugol's solution is of great aid in the pre-operative preparation of the patient provided it is not continued too long before the operation and is not used as a substitute for preliminary pole ligation.

Lahey is of the opinion that the lowness of the mortality in cases of primary hyperthyroidism treated at his clinic is definitely related to the use of graded operations for patients who are seriously ill. The mortality of operations performed in stages was 0.48 per cent in cases of primary hyperthyroidism and 1.55 per cent in cases of secondary hyperthyroidism.

Some of the postoperative deaths of patients with hyperthyroidism are due to cardiac, pulmonary, or operative complications, and some to serious thy-

roid reactions. Without doubt, the occurrence of serious thyroid reactions is definitely influenced by multiple stage operations.

Of the direct signs indicating severity of the intoxication, tachycardia is the most definite and dependable, weight loss only slightly less dependable, and the basal metabolism least dependable. Valuable indirect evidence of the degree of the intoxication is the effect of iodine medication.

It is important to make a notation of the severity of the disease when the patient is first seen. Careful records of one's impression of the disease when the patient is at his worst are of great value in deciding whether to perform a single stage or a multiple stage operation. Severe postoperative reactions occur more frequently when the patient has suffered considerable liver damage because of long duration of the illness. When there is a slight weight loss or no weight gain, the decision should be in favor of a multiple stage operation, as also in the cases of patients with recent vomiting, diarrhea, or any of the signs of a thyroid crisis.

Sometimes the decision as to whether only one half of the operation should be performed must be left until one half of the operation has been completed. Factors in favor of a multiple stage operation when there is doubt under such circumstances are a progressively rising pulse rate, an increasingly widening pulse pressure, a high demand for deep anesthesia or an unusually high percentage of oxygen, and technical difficulties.

Studies of the blood have demonstrated that a very low pre-operative content of cholesterol and iodine in the blood of patients with definite hyperthyroidism is an indication that the condition is severe.

FRED S. MODERN, M.D.

McClure, R. D. Hypoparathyroidism Following Operation for Hyperparathyroidism Due to Adenoma. *Tolerance for Parathyroid Extract*. *Arch. Surg.* 1936, 33, 808.

The first fatal case of hypoparathyroidism following operation for parathyroid adenoma was reported by Wilder. McClure reports another. His patient was a woman fifty-one years old whose illness began six years before her admission to the hospital when, following a fall on the right arm, she developed, just below the right elbow, a hard painless enlargement which had persisted. Two and a half years before her admission she fractured the shaft of the right femur and the site of the fracture had remained sore.

X-ray examination showed moderate to marked osteoporosis in the skull, left femur, pelvis, left humerus, right forearm and mandible, and cyst-like areas in the mandible, right ulna and left femur. The calcium content of the blood was 12.2 mgm., and the phosphorus content 1.8 mgm. per 100 ccm. There were 10.72 Bodansky units of phosphatase.

Operation disclosed a parathyroid adenoma 2 cm. in diameter in the lower pole of the right lobe of the



thyroid. It was partly cystic. Four days after the operation tetany developed. Calcium gluconate controlled the tetany, and under treatment with calcium viosterol and parathyroid extract there was rapid improvement.

Seventeen days after her discharge from the hospital the patient returned because of nausea and nervousness. These symptoms were relieved by calcium gluconate. Studies of the blood showed 7.2 mgm of calcium and 2.86 mgm of phosphorus per 100 c cm, and 4.18 units of phosphatase.

Two months later the patient re-entered the hospital because of persistent vomiting. The blood calcium was 5 mgm and the serum phosphorus 5.27 mgm per 100 c cm. There were 8.73 units of phosphatase. Parathyroid extract resulted in only temporary improvement and parathyroid transplants were ineffective. Circulatory weakness and edema supervened and were uninfluenced by digitalis or thyroid extract. Death followed about four months after the operation.

The author states that death was due apparently to the patient's gradual failure to respond to parathyroid extract. It is difficult to say whether this failure was due to antihormones. In dogs parathyroid extract is ineffective in the absence of Vitamin D. Death might have been prevented if the parathyroid adenoma had not been removed completely or if the operation had been done in 2 stages as suggested by Churchill.

FRED S. MODERN, M.D.

**Jackson C. L.** The Value of Roentgenography of the Neck with Special Reference to Its Use in the Diagnosis and Treatment of Laryngeal and Tracheal Obstruction. *Ann Otol Rhinol & Laryngol* 1936 45 951.

A short historical review of the literature relating to roentgen examination in the diagnosis of lesions of the neck serves as an introduction to the author's discussion of the value of roentgenography as an aid in the diagnosis of obstructive diseases of the larynx and trachea and in a study of the size, shape, and position of tracheotomy tubes and laryngostomy apparatus. Consideration is given to foreign bodies, retropharyngeal abscess, disease of the hypopharynx and cervical esophagus, laryngeal edema, inflammation, stenosis of the larynx and trachea, tuberculosis and syphilis, scleroma, compressive stenosis of the

trachea, benign growths, carcinoma, laryngography, tracheotomy tubes, and laryngoscopy apparatus. Brief reference is made to illustrative cases and numerous roentgenograms with detailed legends are presented. The following conclusions are drawn:

1. Bones in the cervical esophagus can be visualized in the great majority of cases, but care must be exercised not to mistake isolated bits of ossification in the laryngeal cartilages for a foreign body, and vice versa. While bones generally lodge at a slightly lower level, not infrequently they are found just behind the cricoid.

2. Foreign bodies in the larynx lie in the sagittal plane, those in the esophagus, in the coronal plane. If this fact is borne in mind, localization of the foreign body will generally be possible, but a lateral roentgenogram should be made in every case. The lateral view will show a foreign body in the esophagus lying posterior to the trachea and a foreign body in the larynx or trachea lying anteriorly.

3. Retropharyngeal abscess is manifested early by a widening of the retropharyngeal space. This can be seen in a lateral roentgenogram and the course of its development can be followed by serial roentgen studies.

4. The extent and degree of edema and other manifestations of inflammation may be studied by the roentgenologist. Syphilitic and tuberculous lesions of the larynx will generally be shown by roentgen study, but their differential diagnosis cannot be made by roentgen examination alone. Roentgen study is especially helpful in cases in which there is stenosis.

5. Benign growths of the vocal cords are manifested almost always by rounded shadows projecting into the lumen of the ventricle of the larynx, the vestibule or the subglottic airway. It is chiefly in cases of the larger growths that diagnostic roentgen study is of practical value. In such cases it is indispensable.

6. Carcinoma may be studied throughout its course by roentgen examination. As Coutard has shown, roentgenographic study is helpful in the choice of the method of treatment and of value in recording the effect of treatment.

7. One of the most important uses of roentgenography of the neck is determination of the proper position, size and shape of tracheotomy tubes and laryngostomy apparatus. **ADOLPH HARTING, M.D.**

# SURGERY OF THE NERVOUS SYSTEM

## BRAIN AND ITS COVERINGS, CRANIAL NERVES

Charrier, A., and Ferradou M. Metastatic Abscesses of the Cerebrum and Cerebellum in the Course of Bronchopulmonary Suppurations (Sur les abcès métastatiques du cerveau et du cervelet au cours des suppurations bronchopulmonaires) *Rev de chir* Par., 1936, 55 642

Charrier and Ferradou present a tabulation of 51 cases of metastatic cerebral and cerebellar abscesses secondary to bronchopulmonary suppurations, including 3 cases observed in their own clinic. From a review of these cases and of others reported in the literature they conclude that bronchiectasis is the most frequent cause of such abscesses. Of their 51 tabulated cases, the primary condition was bronchiectasis in 19, purulent pleurisy in 14, and lung abscess in 12. Of the total 280 collected cases reviewed (including the 51 tabulated), the primary condition was bronchiectasis in 133, purulent pleurisy in 55, and abscess of the lung in 30.

In 30 of the 51 tabulated cases there was only 1 metastatic abscess. In 21, multiple abscesses were found. Of the 30 single abscesses 3 were in the cerebellum. Of the cerebral abscesses, 11 were in the left and 16 in the right hemisphere. In cases collected by others a single cerebral abscess was found most frequently on the left side of the brain. The frontal and frontoparietal lobes are involved most often. In the cerebral or cerebellar abscess the pus is more or less fluid and frequently fetid. Bacteria are present chiefly in the peripheral zone of the abscess. When the bacteria from both the metastatic abscess and the pulmonary focus were cultured, they were found to be the same.

The metastatic abscess is produced undoubtedly by a septic embolus, which may reach the brain directly through the pulmonary veins, the left side of the heart, the carotid system, and the cerebral circulation, or may be the result of a septicemia causing endarteritis and arterial thrombosis and embolism. Some investigators are of the opinion that the infection reaches the brain by the venous rather than the arterial route.

The symptoms of metastatic abscess of the brain of this type are essentially the same as those of cerebral abscess of other types. There is usually first a stage characterized by slight headache and mental confusion. This may be followed by the sudden onset of hemiplegia suggesting cerebral hemorrhage. However, if hemiplegia occurs, it is usually gradually progressive. In some cases the symptoms may resemble those of meningitis (6 of the cases tabulated by the authors). In others they consist of gradually increasing headache and mental confusion with sometimes vomiting and ultimate coma (21 of the author's collected cases).

Headache is one of the essential symptoms of brain abscess and indicates increased intracranial pressure. Other symptoms and signs due to intracranial hypertension are the mental symptoms (which sometimes include delirium), vomiting, slowing of the pulse (observed in several of the authors' collected cases), paralysis of the oculomotor nerves (rare), and choked disk. Choked disk is an important sign, but by no means constant. In the cases collected by the authors, ophthalmoscopic examination was rarely reported. An increase in the pressure of the cerebrospinal fluid obtained by lumbar puncture was rare. While a rise in the temperature is unusual in other types of brain abscess, the authors find fever to be the rule in their cases of metastatic brain abscess. In 20 of their collected cases in which the cerebrospinal fluid was examined it was always sterile. In 17 examinations it was found clear. In 10 cases there was a definite lymphocytosis, and in 5 a polynucleosis. The albumin was usually increased. In only 6 of the 51 cases collected by the authors was the neurological examination entirely negative. There was some motor disturbance—hemiplegia or monoplegia—but sensory disturbances were rare. However, the authors find that these signs do not always reveal the exact localization of the abscess or show whether the lesions are multiple or single. There may be a secondary abscess or an extension of the lesion to a "silent area" of the brain. While the diagnosis of metastatic abscess of the brain is difficult, the possibility of this complication should be kept in mind in the treatment of pulmonary and pleural infections, and especially chronic bronchiectasis.

The prognosis of metastatic abscess of the brain of this type is poor. Of the authors' 51 collected cases, a trephine operation with drainage of the abscess was followed by recovery in only 3. However, the 3 recoveries appear to justify operation when the diagnosis can be made definitely and the localization of the abscess can be determined fairly well by careful interpretation of the neurological signs.

The authors report in detail 1 of the 3 cases treated at their clinic at Bordeaux. The 2 others included in the table were reported previously by Charrier.

ALICE M. MEYERS

Sosman M. G. The Reliability of the Roentgenographic Signs of Intracranial Tumor. *Am J Roentgenol*, 1936, 36 737

At the Peter Bent Brigham Hospital, Boston, 1,229 roentgen examinations were made of 930 patients referred during the last year of Cushing's service. The roentgenographic interpretation was made independently before the roentgen findings were correlated with the history and the findings of physical examination.

Roentgenographic findings indicative of an intracranial tumor are of 3 types (1) general or non-specific signs such as evidence of increased intracranial pressure causing increased convolutional markings separation of the sutures and atrophy of the sella or the sphenoid wings (2) localizing signs such as localized thinning of the vault or base increased vascularity in one area or displacement of the pineal gland and (3) signs localizing and identifying the type of tumor such as expansion of the sella due to a pituitary adenoma or the characteristic bony spicules increased vascularity and changes in the bone overlying a meningioma.

A statistical summary shows that the diagnosis of the presence and location of an intracranial tumor was made more accurately by roentgenography exclusive of encephalography and ventriculography than by the clinical methods used on the medical service. The neurosurgical service had a higher percentage of accurate diagnoses than was obtainable by roentgenography alone but had also the advantage of the roentgen examination. Differences of opinion and conflicting evidence were discussed at conferences in order to obtain the best interpretation. By roentgenography alone the location of the tumor was diagnosed in almost one half of the cases and the histological type was diagnosed in one-quarter. In only 4 per cent of the cases was a false diagnosis of tumor made. In 49 per cent of the cases of verified tumor there were no indications of the presence of a neoplasm in the roentgenograms.

A statistical table shows the variations in the accuracy of diagnosis according to the type or location of the tumor. Of the verified pituitary adenomas 91 per cent were diagnosed by x-ray examination and of the verified meningiomas 67 per cent were localized. Of the verified acoustic neuromas 53 per cent showed positive findings. The roentgenograms were positive in 45 per cent of the cases of cerebellar tumor. Of the gliomas 46 per cent showed signs of localization or calcification.

Ventriculography was used 116 times. In 62 cases a verified tumor was found and in 95 per cent of these the tumor was located correctly.

If ventriculography is used in addition to roentgenography practically all intracranial tumors large enough to cause symptoms can be located. The exceptions will be some of the subtentorial tumors small tumors in or around the optic nerve or chiasm and small pituitary adenomas. In cases of pituitary adenoma ventriculography is not advisable.

EDWARD S. PLATT, M.D.

an immediately directive accurate diagnosis but also at operation demonstrated the right hemisphere and the clinic duration of the disease—the noted sixteen years before the assumption that the ne angioma.

The patient was a man. The condition began with pain. From the hand the gradually and progressively tremor and the left side of the one and a half years Jacksonian limbs of the left side gradually. Recently the patient had begun with headache and a decrease. Just before operation the following pronounced tremor of the hand over the right half of the skull to the right and left. The entire skull and the upper margin of the sensitive to pressure. There temporal arteries but that of the pronounced than that of the left test was positive. Limitation of motion and a contractural posture of the limbs on the left side were reflexes on the left side were extreme. Babinski sign was noted and spasticesthesia and hypalgesia of the entire body were present. Walking was with clonus and slight trembling. Atformed for brain tumor at another clinic. plasm of unknown nature was past depths.

Before arteriography was undertaken puncture was done and somewhat cerebrospinal fluid was evacuated from the horn. The findings of bilateral permitted a positive diagnosis of a racemose angioma. Intervention was immediately considered. With the duration of the disease the patient became stronger and more active.

Benedek, L. and Huettl, T. The Importance of Cerebral Stereo Angiography in Connection with Operative Treatment of Cerebral Hemangioma. (Ueber die Bedeutung der cerebralen Stereoangiographie in Verbindung mit der operativen Behandlung des cerebralen Haemangioms). *Ztsch. f. Neurol.* 1936 156 132.

In the case reported in this article, most arterial angioma, stereo angio-

lently in cases of hemangioma there is also a  
 S<sup>h</sup> due to the negative pressure  
 the possibility of filling the cavernous portion is  
 definite practical importance and of value in  
 advancing the surgery of angiomatous tumors. It  
 is possible that the accessory branches of the internal  
 carotid instead of the main trunk might be ligated.  
 The reported case demonstrates that a collateral  
 supply through the vascular system of the other  
 hemisphere is assured and that loss of function of  
 important parts of the brain need not be feared in  
 spite of the increased demands for blood.

In conclusion the authors explain the new terms  
 which they have found necessary.

The views which are possible by substitution of  
 the stereogram half picture and half way rotation  
 of the arteriographic roentgenogram (after right  
 sided and left sided filling with thorotrast) are  
 described as follows:

1. The stereoscopically viewed roentgenogram  
 appears to the observer as 'orthotaxic' when the  
 right sided projection half picture is projected into  
 his right eye and the left sided half picture is pro-  
 jected into his left eye.

2. The cerebral stereogram is designated as  
 'allelotaxic' when, because of exchange of the half  
 films, the observer sees the arteriographic false optic  
 image of the non corresponding side.

3. The view is designated as 'ipsilateral' when  
 the stereoscopic image of the vascular system of a  
 hemisphere is viewed from the same side.

4. It is designated as "periscope" when the  
 cerebral stereo angiogram is viewed from the oppo-  
 site side e.g., the right hemisphere is viewed from  
 the left side.

Therefore when there has been bilateral filling  
 of the carotids with the opaque medium, 8 stereo-  
 scopic views are possible.

(LOEB) JOHN W. BRENNAN, M.D.

Love J. G. and Kernohan J. W. Dermoid and  
 Epidermoid Tumors (Cholesteatomas) of the  
 Central Nervous System. *J Am M Ass* 1936  
 107 1876

This report is based on a clinical surgical, and  
 pathological study of 15 congenital epithelial tumors  
 (epidermoids, dermoids, pearls, tumors, and chole-  
 steatomas) of the central nervous system which have  
 been verified microscopically at the Mayo Clinic.  
 Fourteen of the 15 patients were operated on by the  
 members of the neurosurgical staff of the Clinic  
 with 3 postoperative deaths. Fourteen of the tumors  
 were intracranial. One dermoid was found in the  
 spinal cord.

Dermoid and epidermoid tumors (cholesteatomas  
 or pearls, tumors) of the central nervous system are

benign congenital neoplasms of epithelial origin.  
 Their clinical course is variable. The intradural  
 variety is not diagnosed prior to operation. The  
 extradural type can be recognized roentgenographi-  
 cally. Surgical removal of these tumors is possible,  
 and the results are good. In each of the 15 cases  
 reviewed a diagnosis of tumor was made, and in 14  
 operation was performed and the presence of a  
 tumor verified. Twelve of the patients recovered  
 and were living at the time this report was written.  
 The length of their survival after surgical removal  
 of the tumor ranged from one month to six and a  
 half years.

Hoover, W. B., and Poppen, J. L. Glossopharyngeal  
 Neuralgia. *J Am M Ass*, 1936 107 1015

With the purpose of clarifying the clinical signs of  
 glossopharyngeal neuralgia, the authors report 2  
 cases of the condition. The first was that of a man  
 fifty nine years of age who suffered frequent, short,  
 severe attacks of lancinating pain in the left side of  
 the throat which at times extended into the left ear.  
 The trigger zone was in the left tonsil. Pressure on  
 this zone, talking, chewing, and swallowing caused  
 sudden onset of the pain. Treatment with inhala-  
 tions of trichlorethylene resulted in temporary relief.

The second case was that of a woman seventy two  
 years of age who suffered pain of a similar type on  
 the right side of the throat. This was caused by  
 eating and talking, and always occurred when the  
 patient was requested to swallow a weak solution of  
 acetic acid. The attacks left her with a hoarse  
 husky voice. In this case also inhalations of tri-  
 chlorethylene resulted in relief.

The authors review the literature on glosso-  
 pharyngeal neuralgia from 1920 to date. In 1924,  
 Adson used the cervical approach to the nerve and  
 treated it by avulsion. In 1927, Dandy showed that  
 intracranial section of the nerve does not produce  
 any motor loss in the pharyngeal muscles, and that  
 section of the vagus fibers to the pharynx is not  
 necessary to relieve the pain.

Glossopharyngeal neuralgia is to be differentiated  
 from neuralgia of the mandibular division of the  
 trigeminal nerve. However, in 1935, Peet reported 5  
 cases of combined glossopharyngeal and trigeminal  
 neuralgia.

The treatment of choice is intracranial section of  
 the ninth nerve. Alcohol injection is difficult be-  
 cause the nerve in the neck is small and dangerously  
 close to the vagus, jugular, and hypoglossal nerve.  
 Objections to cervical avulsion are that the dissec-  
 tion is difficult, the operation may be followed by  
 recurrence, and the intracranial portion of the nerve  
 is not visible. Medical treatment is only palliative.

JOHN MARTIN, M.D.

# SURGERY OF THE THORAX

## TRACHEA LUNGS, AND PLEURA

**Biasini A** *The Importance of Roentgen Findings in the Study of the Changes Occurring in the Lung in the Course of Surgical Retractable Collapse Therapy* (Sull importanza del rilievo radiologico per lo studio delle modificazioni che avvengono nel polmone nel corso della retrattile collasoterapia chirurgica) *Radiol med* 1936 23 173

The author has previously made a detailed histological study of the changes which occur in collapse therapy of the lung. In this article he supplements the information thus obtained with that obtained by roentgen examination, the importance of which he stresses. He states that the histological findings are very incomplete without the data obtained by roentgen examination.

After reviewing the literature on the subject he reports the findings of angiographic and bronchographic studies which he made of living normal rabbits and living rabbits subjected to different methods of pulmonary collapse therapy—hypertensive and hypotensive pneumothorax, excision of the phrenic nerve, thoracoplasty and filling—and roentgen studies of dead animals and anatomical specimens. These show that compression treatment reduces the functional activity of the peripheral part of the lung more than that of the central part. They confirmed the clinical observation that, in the cases of patients in good general condition, roentgenographic demonstration of the vessels and bronchi can be done without harm if it is carried out with the proper technique, the proper contrast media (thorotrast and related substances) and observance of the known contra indications.

The contra indications are pathological conditions of the vascular system, fragility of the vessels, diseases with a tendency toward hemorrhage, the rupture of a pathological spleen, serious lesions of the reticulo endothelial system, open tuberculosis in the phase of hemoptysis, insufficiency of the liver and kidneys, leukemia, febrile conditions, severe heart lesions and epilepsy.

The contrast medium may be injected not only into the smallest branches of the vessels but also into the finest intralobular bronchi and even the bronchioles. The roentgenograms will show interruption of the progress of the medium caused by isolated compressions, zones of collapse and cicatricial or sclerotic contractions.

Collapse treatment places the lung at rest. With reduction of the functional activity and blood supply of the lung new formation of connective tissue takes place and may render the collapse permanent. This new formation of connective tissue produces conditions unfavorable to the life of the tubercle bacilli and may lead to definite cure. In

each case careful consideration of the various techniques is necessary to determine which method is best adapted to bring about permanent collapse and the development of a strongly retractile fibrosis which will give the desired results.

AUDREY GOSS MORGAN, M.D.

**Leztus, A** *Lung Abscess (Der Lungenabscess)* *Ergebn d Chir*, 1936 29 511

This article has 58 illustrations and an 8 page bibliography.

In Part 1 the author presents a general discussion of the origin of lung abscesses, including those due to pneumonia, metastasis, aspiration, the spread of inflammation from surrounding tissues and lung trauma.

In Part 2 he takes up the course and manifestations of acute lung abscesses, the condition of the pleura, interlobar empyemas, and suppuration due to a foreign body in the lung.

In Part 3 he discusses in detail the treatment of acute lung abscesses. This is divided into conservative treatment to aid spontaneous cure of the abscess, collapse procedures, and bronchoscopic and surgical treatment. With regard to the surgical treatment the choice of time for the operation, the localization of the abscess, the natural and artificial obliteration of the pleural space, the type of anesthesia employed and the approach to and the opening of the suppurative focus in the lung are discussed. Plombage as a preliminary operation, its technique and effect and the technique of opening an abscess in the presence of an open pleural space, pyopneumothorax, and suppuration due to a foreign body, and finally operation for pulmonary abscesses due to esophagopulmonary fistulas are considered. This part of the article is concluded with a discussion of the postoperative course and after care and the surgery of lung fistulas, both solitary bronchial fistulas and those due to necrosis of the lung.

In Part 4 the author discusses chronic lung abscess, its formation and pathologic anatomical character, its clinical picture, and its surgical treatment by thoracoplasty, intrathoracic plombage by the method of Zaajer, the method of Nissen, and lobectomy. This is followed by a short review of the results obtained.

With regard to the surgical treatment of acute lung abscesses attention is called to the fact that the prognosis depends to a considerable degree on the time that operation is attempted and the choice of operative procedure. The earliest possible opening of the accurately localized focus should be done. Agglutination of the pleural surfaces at the operative site is necessary as the primary procedure. This can be accomplished by the extrapleural packing method of Sauerbruch.

With certain exceptions, the mortality of acute and chronic lung abscesses treated surgically is about 30 per cent. In cases of chronic lung abscess the prognosis for cure is still unfavorable.

(HEINEMANN GRUENDER) PHILIP SHAPIRO, M.D.

Allen, C. I., and Blackman, J. F. The Treatment of Lung Abscess. *J. Thoracic Surg.* 1936, 6: 156.

In 100 cases of pulmonary abscess reviewed by the authors the mortality was 34 per cent. In the first 50 cases it was 42 per cent and in the last 50 all of which were treated during the last five years, it was 26 per cent. In 6 fatal cases death was due to a carcinoma which was producing abscesses by obstruction. In the remaining 94 cases, the mortality was 29.7 per cent. The reduction of the mortality in the last five years may be attributed to earlier diagnosis and treatment, closer cooperation between internist and surgeon, more accurate localization, and earlier institution of more radical treatment when conservative treatment had failed.

Conservative treatment should not be continued unless progressive improvement is noted. In selected cases phrenic nerve crushing is advisable. Treatment with arsenicals has been found to yield good results by some and perhaps should be given a wider trial. In most cases bronchoscopic drainage has not proved of great value except as a diagnostic procedure. It is of aid chiefly in cases of abscess caused by a foreign body. The use of pneumothorax in the treatment of lung abscess is apparently not justifiable. Operative drainage should always be done in 2 stages and a wide area for drainage should be established. The drainage tract down to the abscess should be made with the actual cautery. Tube drainage of complicating empyema is some times of value when the patient's condition is so critical as to make a more radical operative too hazardous.

J. DANIEL WILLEMS, M.D.

Graham, E. A., and Singer, J. J. Three Cases of Resection of Calcified Pulmonary Abscess (or Tuberculosis) Simulating Tumor. *J. Thoracic Surg.* 1936, 6: 173.

The authors report 3 cases of calcified pulmonary abscess or tuberculosis in detail, giving the history, the findings of roentgen examination, and the findings of gross and microscopic examination of the lesion after its surgical removal.

They believe that in the first case the lesion was the result of an old pulmonary suppuration which had healed with the formation of a considerable amount of fibrous tissue and calcification.

In the second case they were unable to decide whether it was an old partly healed interlobar empyema or a healed inspissated abscess of the lung. There was nothing in the patient's history which was suggestive of pulmonary suppuration.

In the third case the lesion may have been a congenital malformation, such as a cyst, or a healed small interlobar empyema with a bronchial communication. It did not appear to be tuberculous,

and its location indicated that it was not originally a pulmonary abscess.

In all 3 cases the lesion was associated with cough and expectoration and was diagnosed as a tumor. The lesions were not neoplastic, but consisted of a central portion of necrotic tissue surrounded by either calcium or bone. In all 3 cases the symptoms were completely relieved by removal of the pseudo-tumor. No bacteria could be found in the central necrotic portions of the lesion either on smear or by cultural methods. In the third case the central cavity was lined with ciliated epithelium which appeared to be derived from bronchial epithelium. In this and the second case there was a suggestion that the original condition might have been an interlobar empyema.

In conclusion the authors state that the question as to whether any or all of the lesions were tuberculous or pyogenic in origin must remain unanswered. In their opinion the feature of these cases which was of most importance from the clinical standpoint was the erroneous diagnosis of the lesions as true tumors before they were inspected and examined.

EMIL C. ROENTGEN, M.D.

Peterson, H. O. Benign Adenoma of the Bronchus. *Am. J. Roentgenol.* 1936, 36: 836.

Benign adenomas make up approximately one-half of all benign bronchial tumors. The history is fairly characteristic because of the long duration of the tumor and the repeated hemoptysis. A dry non-characteristic cough, which frequently becomes productive, is almost always present. Of the author's 9 patients 8 complained of pain and soreness in the chest. Pleurisy and repeated pneumonia are common complications. Dyspnea is not a prominent symptom, but severe attacks when the recumbent position was assumed have been reported. These attacks are due presumably to the sudden rising of a pedunculated tumor into the trachea.

The age incidence varies from the eleventh to the sixty-seventh year, but 50 per cent of the tumors occur between the ages of twenty and forty. In contrast to carcinoma of the lung, benign adenomas are found less often in males than in females.

The physical findings are those produced by a partial or complete bronchial obstruction and may vary from nothing at all to signs of complete atelectasis of an entire lung. As the tumor grows, all of the signs of chronic pulmonary suppuration may develop. The roentgen findings are largely those of atelectasis of varying degree. Bronchoscopy and biopsy are necessary to establish the diagnosis definitely.

When treatment is given early the prognosis is excellent, but when treatment is not given atelectasis and extensive pulmonary suppuration eventually result in death. Therefore a prompt and correct diagnosis is of importance. The treatment is in great part a bronchoscopic procedure.

JOSEPH H. NARAT, M.D.

Utter O The Treatment and Prognosis of Pleural Empyema in Childhood (Ueber die Behandlung und Prognose der Pleuraempyeme im Kindesalter) *Archiv f. Chirurg.* 1936 78 343

On the basis of 28 cases of pleural empyema in children under thirteen years of age and a review of the recent literature on the condition, the author attempts to draw conclusions regarding the treatment and prognosis.

According to the treatment he divides his cases into the following 4 groups:

Group 1 Those treated only by puncture the attempt having been made to evacuate the pus from the pleural cavity by aspiration.

Group 2 Those treated by thoracentesis in which the attempt was made to evacuate the pus by a tube or cannula introduced between the ribs.

Group 3 Those treated by primary resection in which at the time of or soon after the diagnosis resection of ribs and thoracotomy were done.

Group 4 Those treated by secondary resection in which rib resection and thoracotomy were preceded by puncture or thoracentesis.

Utter designates as cases treated by secondary resection only those in which the resection was preceded by at least 4 punctures.

Of 33 patients treated by puncture alone 20 (37.5 per cent) recovered, 6 (17 per cent) died, and 24 (43.4 per cent) required a secondary operation.

Treatment by puncture was used only in cases of empyemas of small or moderate size. Total empyema could not be cured by even as many as 20 punctures.

Of 48 patients treated by thoracentesis 33 (68.7 per cent) were cured, 5 (16.7 per cent) died, and 7 (14.6 per cent) required a secondary resection.

Of 143 patients treated by primary resection 59 (61.4 per cent) were cured, 29 (33.8 per cent) died, and 7 (4.8 per cent) developed chronic empyema.

Of 4 patients treated by secondary resection 36 (80 per cent) recovered, 8 (17.8 per cent) died, and 1 (2.2 per cent) developed chronic empyema. The results of secondary resection were best when treatment by puncture had been continued for about a week or from 3 to 7 punctures had been done.

In cases in which puncture was continued longer the prognosis was poorer and the children obviously suffered from the continued puncturing.

The author draws the following conclusions:

In cases of empyemas of small or moderate size cure by puncture should be attempted. When there is no noteworthy diminution in the pus after about 3 punctures secondary resection should be done. If the patient's condition does not permit prolonged treatment by puncture or if the pus is too thick to be removed by aspiration thoracentesis should be done and if necessary supplemented later by resection.

In cases of large empyemas palliative treatment by puncture should always be given at first and followed at the proper time by resection. In these cases thoracentesis may be considered as a middle-stage procedure.

Of special importance in the prognosis is correct determination of the time for operation.

In addition to surgical treatment, children should be given general pediatric treatment.

## HEART AND PERICARDIUM

Westermann, H. H. Operation and the Results of Excision of the Pericardium in Dense Fibrous Pericarditis (Die Operation und die Ergebnisse der Exzision des Herzbeutels bei schwerer chronischer Perikarditis) *Ergebn. d. Chir.* 1931 27 413

Fibrous pericarditis was first differentiated from other diseases of the pericardium by Krumm in Germany and by Hutinel in France. Pich described the condition under the name "pseudo-hypertrophic." Total obliteration of the pericardial surfaces has been found incidentally at autopsy in subjects who had no symptoms of the condition. However under such circumstances the adhesions were so thin that they did not interfere seriously with cardiac function. It is only when there are dense or calcined indurations that stasis, especially in the liver and ascites and pleural effusions occur.

It is astonishing how long operative intervention on the pericardium was avoided through fear. Even Billroth objected to paracentesis. Separation of the pericardial adhesions was first proposed in 1895 by Delorme. Brater's cardiostomy was introduced in 1902. It was based on the belief that the work of the heart would be reduced by removal of the cartilaginous elastic conal ring which was drawn in with each cardiac contraction. This method is very good, but is applicable to only a few cases—those in which the adhesions are limited to the anterior portion of the pericardium. Rehn proposed removal of portions of the pericardium in addition to liberation of the adhesions. Since 1909 Volhard has recommended operation and, with Schminck, has established fundamental principles for the treatment.

Animal experiments have been of little aid. Alexander found that the ventricles are insensitive to gentle manipulation. High pressure and pressure with a needle were perceived, beat and cold were not. In patients operated on under local anesthesia there were only 2 reflexes: (1) voluntary turning of the body as a whole on painful irritation, and (2) cough reflex when the pericardium was irritated.

Schminck demonstrated that the operation can be performed under local anesthesia with practically no pain. When the pleura is opened there is of course an immediate disturbance of respiration. According to Fuhr, Evster and Tippe, the pericardium protects the heart against overdistention. According to Felix it protects especially the right ventricle. As an indurated contracting inflammation gradually results in relaxation of the heart muscle the question arises whether resection of the pericardium does not rob the relaxed heart, especially the right ventricle of its necessary support.

In 1931 Beck carried out experiments which showed that under atmospheric pressure the con-

put of the heart is markedly decreased, and that, under positive pressure the decrease is still greater. He attributed the usually sudden deaths which occur after intrathoracic operations to anesthesia induced with positive pressure and therefore recommended the use of Sauerbruch's negative pressure chamber.

According to the protocols of 26,000 autopsies and to 75,000 clinical histories reviewed by Gerke the cause of fibrosing pericarditis was rheumatism in 19.1 per cent of the cases, tuberculosis in 15.6 per cent, pneumonia in 14.2 per cent, sepsis in 17.0 per cent, various other conditions in 23.1 per cent, and an undetermined cause in 2.4 per cent.

Retraction of the chest wall may be absent. The differential diagnosis from mitral stenosis is not always easy, but was well established by Volldard. In mitral stenosis a systolic retraction of the chest wall in the region of the heart is not infrequent, but in contrast to the quietness of the walled up heart in pericarditis strong movement of the right ventricle can be felt and the diastolic murmur at the cardiac apex can be heard.

Unless operation is performed, fibrosing pericarditis leads sooner or later to death. Operation is therefore indicated but only after the infection has completely subsided. It should be done under local anesthesia. Positive pressure should be available in case of injury to the pleura. The left ventricle and cardiac apex should always be freed first. If the right ventricle is liberated from the indurations first, an acute over dilatation with consequent irreparable tricuspid insufficiency will result. Indurations at the orifice of the inferior vena cava are unconditionally to be removed. The correct plane of cleavage for decortication of the heart is difficult to find. The surgeon must proceed with great caution. The cartilaginous portion and the attached osseous portions of the third to the fifth ribs and a large part of the sternum should be removed. The wound should then be closed completely around 2 or 3 small drains. The latter are necessary because hemostasis is difficult and at first there is a marked watery exudation. The patient should be prepared with strophanthin and diet.

Opinions regarding Schmieden's technique are cited. Many surgeons believe that as good results are obtained with cardiolysis alone. This is incorrect. Schmieden has had the largest series of cases (26). In all, 110 cases have been operated upon. The author summarizes these in 2 tables. Twenty per cent of the patients were cured, 18.1 per cent were benefited sufficiently to work, 7.3 per cent were benefited but not sufficiently to work, 1.8 per cent were not benefited, 6.4 per cent died during the operation, 18.2 per cent died during postoperative treatment, 15.5 per cent died after temporary improvement and 12.7 per cent could not be traced. In Schmieden's cases the incidence of cure and improvement was 60 per cent, whereas in those treated by other surgeons it was only 42.1 per cent.

(FRANZ) PHILIP SHAPIRO, M.D.

## ESOPHAGUS AND MEDIASTINUM

Neuhof, H. Acute Infections of the Mediastinum, with Special Reference to Mediastinal Suppuration. *J. Thoracic Surg.* 1936, 6, 184.

This article is based on 66 cases of various forms of acute suppurative and non suppurative infection of the mediastinum, in the great majority of which the diagnosis was confirmed by operation, roentgen examination, or autopsy.

The author discusses the classification, pathogenesis, bacteriology, pathology, clinical manifestations, physical and roentgen features, diagnostic problems, indications for operation, operative treatment and results of treatment of such infections.

In his opinion the impression that acute infections of the mediastinum are rare is erroneous. He states that the most common causes of suppurative lesions are traumatic perforations of the esophagus and infections in the cervical region. Among the pathological features of posterior mediastinal abscess are a limited inflammatory reaction, absence of superficial pleural adhesions and rupture of the abscess into the lung and bronchi. Suppurative pleurisy is characteristic of phlegmonous mediastinitis.

Neuhof divides acute mediastinal infections clinically into the fulminating, the moderately severe and the relatively mild forms. Textbook pictures, he believes, are rarely seen and physical signs generally unreliable.

In cases of mediastinal infection from the cervical region examination of the neck yields important information. The roentgenogram of the mediastinum is usually positive and that of the neck offers decisive information when low cervical infection is the source of the mediastinitis.

Neuhof advises immediate operation when perforations of the cervical or thoracic esophagus have occurred and when mediastinitis has developed. He regards operation as indicated also when there is any evidence of a localized suppuration. He believes that under certain circumstances exploration is justified in the absence of positive evidence of a mediastinal abscess. He states that recovery may follow operation even in advanced cases.

He describes a technique for approach to a cervical periesophageal abscess which serves also for drainage of the upper posterior mediastinum. In posterior mediastinotomy the site of the incision depends upon roentgen localization of the level of the lesion. In most of the reviewed cases the free pleura was traversed. By proper management of the pleural opening empyema after a 1-stage operation may be prevented.

Of the author's cases of mediastinal abscess which were not operated upon, death resulted in all, whereas in 4 of 5 in which operation was performed the patient recovered. Of 8 patients with a complicating lung abscess, empyema, or phlegmonous mediastinitis, 4 recovered and 4 died.

Neuhof concludes that mediastinal abscess is a condition in which the results of operation should be



good unless complications have developed as the result of delay  
EMIL C. ROBITSEK M.D.

Middleton W. S., Pohle E. A. and Ritchie G.  
Lymphosarcoma of the Mediastinum with Metastases to the Skeleton Report of a Case  
*Am J Cancer* 1936 28 559

The case reported was that of a boy sixteen years of age. Although the tumor was proved by microscopic examination to be radiosensitive, roentgenograms showed an increase in the size of the mediastinal mass under irradiation treatment. The authors believe that this increase may perhaps be explained by the presence of a capsule which was expanded by pressure from necrosing tumor tissue and bleeding from eroded vessels. The severe pain in the secondarily involved bones was promptly relieved by irradiation.  
JOSEPH K. NARAT M.D.

#### MISCELLANEOUS

Bird, C. E. Division of Ribs as an Aid in Closing a Diaphragmatic Hernia  
*Ann Surg* 1936 104 993

The simple maneuver of mobilizing 2 or 3 of the lower ribs is of aid whenever the diameter of the

lower thoracic outlet must be diminished for satisfactory closure of a defect of the diaphragm. This is easily accomplished in children.

The author reports in detail and with illustrations a case which he believes is the third in which this procedure was used.

In the cases of older patients whose ribs are unyielding, the removal of 2 short segments from each rib, one segment anterior and the other posterior to the defect, will allow the ribs to drop in sufficiently for closure of the hernial opening without damage to the intercostal vessels or nerves or the pleura.

GEORGE A. COLLETT M.D.

Skinner, C. F., and Hobbs, M. E. Intrathoracic Cystic Lymphangioma  
*J Thoracic Surg*, 1936, 6 98

Skinner and Hobbs report in detail a case of large mediastinal cystic lymphangioma in a seven year old boy. The diagnosis of cystic tumor was made by roentgen examination after the injection of air into both the neoplasm and the pleural cavity. Complete extirpation of the tumor was accomplished in a 2 stage operation. One and a half years later the patient was still free from signs of recurrence.

ELIZABETH M. CRANSTON

# SURGERY OF THE ABDOMEN

## ABDOMINAL WALL AND PERITONEUM

Sutton, L. E. The Intrapertoneal Approach for Repair of Inguinal Hernia *Ann Surg*, 1936, 104: 1030

The author reports on 100 cases in which the intraperitoneal approach was used for the repair of an inguinal hernia. He states that the facility of operation for the repair of hernias of this type depends not only on the type and size of the hernia but also on the exposure of the structures involved. The importance of high ligation of the sac is generally admitted. The intraperitoneal approach described by La Roque gives better exposure of the internal ring than the usual approach and is of value especially in cases of large sliding hernia and some cases of strangulated hernia with small indurated rings. The essential difference between the intraperitoneal and the usual approach is the addition to the former of a muscle split and peritoneal incision just above the internal ring.

In the intraperitoneal approach the skin incision is the incision usually made for the repair of inguinal hernia. The aponeurosis of the external oblique is cut and reflected to expose the internal oblique. The cremaster is then seen masking the spermatic cord. The site of the muscle split is usually 1 in. above the lower edge of the internal oblique. The muscle is split parallel with its fibers and retracted to expose the transversalis fascia just above the internal ring. The transversalis fascia and peritoneum are incised as in an appendectomy, though at a somewhat lower level. The peritoneal cavity is then open at a point little more than  $\frac{1}{2}$  in. above the internal ring.

The abdominal opening of an indirect sac is then rolled outward and explored with a finger or an instrument. The contents of the sac are liberated and reduced into the abdomen, and sites of a possible direct and femoral hernia are palpated.

The neck of the sac is then separated by blunt dissection, the fat being pushed away from the outside of the peritoneum in the place between the peritoneum and transversalis fascia. After it has been entirely liberated, the peritoneum is slit down to and around the neck of the sac. Where adhesions have been removed the damaged parietal peritoneum is removed to reduce the chance of adhesions.

In reconstruction of the internal ring the transversalis fascia is sutured snugly around the cord structures. From that point on, the repair may be done according to the choice of the surgeon. In the reviewed cases, imbrication of the external oblique aponeurosis beneath the cord was done most frequently. Sharp dissection was used, and the tissues were handled gently with careful retraction. Fine needles and fine absorbable sutures were employed. Double catgut was used for ligatures. Tight su-

tures were avoided, and special attention was paid to hemostasis and the elimination of dead space. The average patient was kept in bed for two weeks, and patients with fascial transplants, for three weeks.

Of the patients whose cases are reviewed, 78 per cent were between twenty and fifty years of age. Ninety one per cent were followed for one and one half years. In 69 per cent of the cases a fascial (modified Andrews) type of repair was done. The 2 recurrences occurred sixteen and eighteen months respectively after a muscle to fascia type of repair of a direct hernia in which the aponeurosis was not imbricated beneath the cord.

Only from 2 to 5 per cent of hernias are of the sliding type. In the intraperitoneal approach it is possible to fix the replaced bowel away from the hernial site without making another skin incision. When the parietal peritoneum has been sufficiently mobilized the viscus may be pulled upward so that when the peritoneum is closed it lies nearly 2 in. above the internal inguinal ring.

In cases of strangulated hernia the intraperitoneal approach is especially advantageous. When the peritoneum is opened the surgeon can see immediately what viscus is in the sac and proceed accordingly. If it is safe to reduce the contents of the hernia this can usually be done by gentle traction from within. Exposure by the intraperitoneal approach is adequate for enterostomy or resection.

In cases of incarcerated and adherent hernias the intraperitoneal approach is of value because adhesions usually due to a raw surface adjacent to the internal ring are a factor in the development of recurrence and by this approach adhesions may be dissected free without causing trauma.

It is generally agreed that inguinal hernia in children can be cured by high ligation of the sac. The less the cord is disturbed the better. The intraperitoneal approach leaves the cord undisturbed and assures high ligation of the sac.

The intraperitoneal approach is of value chiefly for (1) direct exposure of the internal ring without prolongation of the operation, (2) ease of dissection of the adherent sac after isolation of its neck, and (3) high ligation of the sac.

In cases of direct or femoral hernia the author prefers to open the peritoneum through the posterior wall of the inguinal canal.

FRANK E. STINCHFIELD, M.D.

## GASTRO-INTESTINAL TRACT

Manzini, G. Two Cases of Primary Melanocytoblastoma of the Intestine (Su due casi di melanocitoblastoma primitivo dell'intestino) *Ann Ital di chir*, 1936, 15: 535

This is a contribution to the study of Pick's intestinal melanosis based on 2 cases of primary

melanoblastocytoma of the intestine. The patients were women forty two and fifty five years old, and the tumors were situated respectively in the small intestine and the descending colon. Minute examination at autopsy excluded the presence of foci of pigmented tissue from which the neoplasms could have originated.

Manzini believes that primary melanomas of the intestine arise from the areas of undifferentiated melanoblasts in the subserous layer described by Pick and Brahn in 1935. These areas which probably represent the remains of the pericelomatic pigment system do not become visible macroscopically until the fourth decade of life, but can be detected microscopically much earlier. The melanin is produced from aromatic groups in the cell proteins under the influence of oxidizing enzymes. At autopsy on 2 middle aged subjects Manzini found such patches from 3 to 10 mm in diameter on the visceral peritoneum near the insertion of the mesentery. The spots are comparable to the zones of dysembryoplastic melanogenetic tissue in the skin except that they arise under special metabolic conditions in later life when the tissues enter a phase of decreased resistance (Borrel's pigmentary crisis). Resumption of the pigmentogenetic function always occurs in cells in which this activity has almost disappeared or has remained in abeyance.

These findings demonstrate the possibility of a primary melanoblastoma of the intestine. Additional evidence is the coincidence of the age at which both the pigmented spots and the tumors appear and the frequent location of both at certain definite points along the intestine. The tumors probably arise not from a single type of cell but from a system composed of mature melanoblasts, potential melanoblasts and cells without pigment producing power. This would account for their polymorphism and irregular pigmentation. Histogenetically they are fundamentally sarcomas derived from undifferentiated mesodermal melanoblasts but because of their variable histological pictures with no predominating type it is more exact to designate them by the general term melanocytoblastoma.

Primary melanoblastomas of the intestine are exceedingly rare only 11 cases including Manzini's case having been reported. This fact is explained by the infrequency of melanomas in general of mesenchymal tumors of the intestine and of subserous pigmented areas.

Manzini discusses the diagnosis and clinical course of these tumors. He states that in the absence of other manifestations of abnormal melanosis the most reliable sign is the presence of melanin in the urine. According to the findings of his researches the melanin in the tumor appears to be different from that in the normal skin. He discusses also the origin of melanomas in general and the nature and classification of pigment forming cells.

The article is accompanied by photographs and a bibliography. M. F. MORSE, M.D.

Morton J. J., and Jones T. B. Obstructions About the Mesentery in Infants. *Ann Surg* 1936 104 864

While the most common cause of organic obstruction in infancy is hypertrophic pyloric stenosis there are a certain number of obstructions which make their presence known almost as soon as the baby takes anything by mouth. These occur in or about the duodenum and are usually in close anatomical relationship to the mesentery of the small intestine. They include duodenal atresias, internal hernias and anomalies due to faults in migration, descent and fixation acting on the first portions of the small intestine.

Congenital intestinal occlusions are commonly classified as intrinsic and extrinsic. The atresias range from complete absence of a portion or portions of the intestines to all grades of intestinal fibrosis and diaphragms occluding the lumen. They occur more frequently in the duodenum than in any other part of the gastro intestinal tract. According to von Koss and Davis and Poynter 30 per cent occur in the duodenum. The extrinsic occlusions result from faulty or incomplete intestinal rotation and hyperperitonealization during fetal development. Internal hernias are encountered less frequently than short mesenteric arteries, incomplete intestinal rotation, abnormal peritoneal bands or adhesions.

During embryonic development the duodenum becomes occluded by proliferation of its lining membrane or epithelium. It remains in this condition so that the lumen is blocked until the sixth week. Normally, the epithelium is then absorbed again. In rare instances its absorption does not occur and it becomes organized. This mechanism results in the various types of atresia encountered in the duodenum as well as elsewhere in the jejunum and ileum.

The authors report 12 cases of obstruction of the duodenum. The causes found at operation were atresia and complete absence of the third portion of the duodenum, a diaphragm of the duodenum, herniation of the intestines into the lesser peritoneal cavity with constricting bands, a retroperitoneal position of the large gut, and herniation into the lesser sac with constriction by the mesenteric artery, reversed rotation of the mid gut on the mesentery, peritoneal bands and adhesions, torsion, plication and hyperfixation.

The most constant sign presented in every case was vomiting. Occasionally this occurred a few hours after birth but as a rule began after the first feeding. The vomiting is usually fairly regular. In doubtful cases the presence or absence of bile in the vomitus has been regarded as evidence respectively of an obstruction above or below the bile papilla.

The presence of blood or coffee ground material in the vomitus is considered pathognomonic of duodenal atresia or stenosis.

On physical examination the signs of dehydration are frequently observed. The infants may show

other developmental abnormalities, or may be born prematurely.

The only problem in the diagnosis is the differentiation of the condition from congenital hypertrophic stenosis. Congenital hypertrophic stenosis usually occurs in males, and the vomiting due to it usually begins during the second to the sixth week. In about three quarters of the cases peristaltic waves passing from left to right can be made out. The other signs are the same in both conditions.

Preliminary preparation for operation is exceedingly important. Loss of weight and dehydration must be combated by restoring the water balance. In the authors' opinion the anesthetic of choice is drop ether. As babies do not stand hemorrhage, shock or infection well, careful hemostasis, gentleness in the handling of the tissues, and measures to prevent heat loss are essential at operation.

In congenital absence of a segment of the duodenum, relief of the obstruction by operation is obviously the only treatment possible. A short circuiting operation is the logical procedure. In cases in which a diaphragm is stretched across the lumen of the bowel a longitudinal incision removing the diaphragm and transverse suturing should be considered as a simpler procedure than intestinal anastomosis. Under no circumstances should enterostomy be performed.

In cases of extrinsic anomalies due to faults in migration, descent and fixation gastroenterostomy or enteroenterostomy should not be attempted. The surgeon should realize that this is the type of obstruction which can be successfully untangled if he knows how to get at it. The best way to unravel these puzzling anomalies is to obtain a clear view of the mesentery. This can be done only by detaching the transverse and ascending colons from the parietal wall and rotating them toward the midline, which gives excellent access to the root of the mesentery.

After operation special nursing care is of great importance. Fluids should be restored. Codein may be used for pain. Distention should be combated at first with stipes and rectal tubes, and later with enemas. Lavage may also be necessary. Acidosis may be prevented by the use of glucose.

HOWARD A. MCKNIGHT, M.D.

Lingley, J. R. Non Obstructing Malignant Tumors of the Small Bowel. A Report of 5 Cases. *Am J Roentgenol* 1936, 36, 903.

Malignant tumors of the small bowel are usually stenosing and obstructive. However, in approximately 25 per cent of 25 cases of such tumors observed at the Massachusetts General Hospital, Boston, the neoplasm was of the non obstructive type. On roentgen examination the involved segment of small bowel was found irregular in outline and showed obliteration of the mucosa and moderate to marked dilatation. Although there was no obstruction the involved area could be visualized even after the barium column had passed beyond it, because of a coating of barium adhering to its ulcerated

surface. In most of the cases a large mass corresponding to the defect in the bowel could be palpated. This was often very large in comparison with the small area of intestine involved.

For the demonstration of such lesions the author recommends examination of the small bowel by roentgenoscopy and roentgenography at intervals of two, four, and six hours after the motor meal.

JOSEPH K. NARAT, M.D.

Berman, J. K., and Baxter, N. I. Duodenogastric Intussusception. An Experimental Study of Peptic Ulcer. *Arch Surg* 1936, 43, 1.

The object of the study reported in this article, which was made on dogs, was to learn what might happen if the ulcer bearing area were brought up into the more acid prepyloric portion of the stomach, in other words, if the superior part of the duodenum were made a living transplant in a new and more highly acid environment. After liberation of the greater and lesser curvatures of the stomach, the pyloric sphincter was divided as for a Rammstedt pyloroplasty and the duodenum then invaginated into the stomach with interrupted Lembert sutures stopping just proximal to the common duct.

Following this operation the gastric acid values were found to be higher and the emptying time approximately forty minutes faster than in the normal controls. In 2 of the dogs the mucin values were higher than in either the normal controls or a dog on which a Finney pyloroplasty had been done.

In 2 dogs killed seven and nine months respectively after the operation no gross changes were found in either the stomach or the invaginated portion of the duodenum. Microscopically, Brunner's glands appeared entirely normal.

In another series of experiments the attempt was made to produce typical ulcer in dogs operated upon by the technique described and a control dog by the administration of cincofen in toxic doses as described by Van Wagoner and Churchill. In the control animal necropsy disclosed multiple gastric and duodenal erosions, several acute ulcers in the pylorus and duodenum, perforation of 1 of the duodenal ulcers, and diffuse hemorrhagic colitis. In a dog with duodenogastric intussusception a diffuse gastritis and duodenitis were present, but there was no ulceration in the stomach or duodenum although the lower part of the ileum and the entire colon contained numerous acute ulcers. An ulcer just above the ileocecal valve had perforated and caused fatal peritonitis.

The amounts of acid and mucin in the stomach were studied in this group of animals after the fourth day. "There was a slight increase in the amount of acid and a greater increase in the amount of mucin in all of the dogs, especially the animals with the duodenogastric intussusception."

As only 1 of the dogs operated upon developed a peptic ulcer after the administration of cincofen, and as this lesion occurred without a significant rise in the acidity, the authors conclude that it is the lack of sufficient protection by mucin rather than an

increase in the amounts of acid *per se* that is responsible for peptic ulcer. They believe it possible also that peptic ulcer in man may be the result of a decrease in acidity with consequent failure of stimulation of Brunner's glands or conversely, inactivity of the glands with consequent deficiency of acid and mucin. They state that there may be a premonitory stage of peptic ulcer when hydrochloric acid would be beneficial by stimulating the mucin producing function of Brunner's glands. If it is the defense mechanism that is important rather than the increase in hydrochloric acid, the parenteral administration of an extract of Brunner's glands might be logical in the treatment of ulcer.

In the authors' opinion it is the failure of Brunner's glands to protect and neutralize rather than high acidity that is responsible for ulcers. Mucin is the local protector of the tissues against acid. Therefore in combating peptic ulcer its presence should be assured.

The authors conclude that their experiments prove that in the treatment of ulcer the pylorus end of the stomach should be reinforced rather than sacrificed as is done in gastrectomy and pylorotomy. For many years they have treated perforated duodenal ulcer by pulling the wall of the stomach down over the perforation and suturing it there. They now believe that the same procedure may be applied around the entire pyloric circumference. This would immobilize the diseased area, reinforce the pyloric walls and transplant active Brunner glands with their protective mucin. It seems that because of its safety and ease of performance in suitable cases this procedure would be of aid in the surgical treatment of chronic ulcer. If scarring of the pylorus is marked or the ulcer is on the stomach side, excision of the ulcer with part of the pyloric sphincter followed by duodenogastric intussusception may be the operation of most permanent value.

SAMUEL J. FOGELSON, M.D.

Nissnevitch, L. M. *Carcinoma of the Duodenum and Its Metastases* (Le cancer du duodenum et ses métastases). *Problemes d'ecol* 1935 10 1.

The author reviews 12 cases of proved primary carcinoma of the duodenum and draws the following conclusions:

1. Primary carcinoma of the duodenum is comparatively rare. It constitutes only 2 per cent of all cancers of the gastro-intestinal tract.

2. It is most frequent at the usual cancer age. The average age of the patients whose cases are reviewed was fifty-one and one fourth years.

3. It is more frequent in males than in females. Of the patients whose cases are reviewed 66 per cent were males.

4. Its origin is usually an old chronic ulcer of the duodenum.

5. The most common form is the adenocarcinoma. This was the type in 60 per cent of the cases reviewed. Other types are the sarcomatous cancer, the colloid cancer, and carcinoma simplex.

6. It usually forms metastases in the organs and lymphatic nodes of the upper part of the abdomen.

7. It must be differentiated from secondary involvement of the duodenum by the growth of a carcinoma in the stomach, pancreas or gall bladder or by metastasis from a carcinoma in an adjoining organ.

8. Its differentiation from secondary cancer of the duodenum is rather difficult, not only during life but also at autopsy.

9. Treatment gives poor results. The prognosis is seldom favorable, the period of survival being rather short in all cases.

Thompson, J. W. *Secondary Resections in Recurring Carcinoma of the Colon*. *J. Am. Med. Ass.* 1936 107 1643.

Carcinoma of the colon is a very common lesion. In about 50 per cent of cases it has advanced beyond hope of surgical relief by the time the patient is first seen by the surgeon. The operative mortality varies from 5 to 35 per cent. Metastasis to the liver and the regional lymphatic glands is a specter always haunting the patient surviving operation. The problem of persuading the patient to submit to an operation for recurrence is even more difficult than gaining his consent to the primary operation. Thompson reports a small series of cases in which a second resection of the large bowel was performed for recurrence successfully. While the recurrence of many malignant growths is often prompt in some cases many years elapse between the primary operation and the recurrence. Ewing has reported a case of breast malignancy in which the interval was thirty years, a case of rectal cancer in which it was twenty-one years, and a case of uterine carcinoma in which it was fifteen years. There is always the possibility that the defenses offered by immunity may isolate and destroy remaining cells or surround them by dense connective tissue.

Thompson reports the following cases:

Case 1. The patient was a man fifty-one years of age who was brought to the hospital December 30, 1931. In November of that year he had first noted constipation. This became increasing worse and was followed by vomiting. When the patient entered the hospital his bowels had not moved for forty-eight hours and his abdomen was distended. A diagnosis of intestinal obstruction was made. A plain roentgenogram revealed enormous distention of the large bowel and some distention of the small bowel. A diagnosis of obstructive lesion of the large bowel was made. At operation performed under spinal anesthesia the cecum was found to be the size of a football. Cecostomy was performed and a No. 24 colon tube inserted into the colon by the method of Witzel. During the next two weeks the bowel was thoroughly washed out daily through the colon tube. A second operation under spinal anesthesia revealed an annular and constricting growth in the pelvic colon. A 6-in. portion of the colon was resected together with a wedge-shaped portion of the mesentery, the bowel being then

re united end to end. The cecostomy tube was allowed to remain in place for about six days in order to effect decompression of the bowel.

The patient made a good recovery and was discharged from the hospital thirty days after his admission. In October 1934, about twenty two months after the first operation, he returned with symptoms of constipation similar to those experienced previously. A barium sulphate enema revealed evidence of obstruction at the junction of the iliac and pelvic colon together with a filling defect and a palpable mass. A second operation, performed through a left rectus incision, disclosed a napkin ring type of growth similar to the first. The tumor was resected with 2 in. of normal bowel on either side and the bowel re united end to end. The patient made a rapid recovery and has remained well to date.

Case 2. The patient was a man fifty four years old whose chief complaints were diarrhea, loss of weight, tenesmus, and mucus in the stools. A palpable mass was found in the right lower quadrant of the abdomen. A barium sulphate enema revealed a filling defect in the cecum. A diagnosis of carcinoma of the cecum with endameba histolytica infection of the intestines was made. W. J. Mayo removed the cecum, ascending colon and terminal ileum together with involved lymph nodes for adenocarcinoma. The patient remained well from 1917 to the Fall of 1929, when he returned on account of the appearance of blood in the stools. A barium sulphate enema disclosed a small filling defect in the transverse colon. An operation performed under spinal anesthesia the liver was found free from metastases but a carcinoma the size of a dollar was discovered in the distal transverse colon. The carcinoma was resected and the intestine re united end to end. Recovery was prompt and in 1936 at the age of seventy five years the patient was in good health except for occasional attacks of angina pectoris.

Case 3. The patient was a man thirty six years of age who gave a history of mid epigastric pains after meals. A barium sulphate enema showed a filling defect in the proximal transverse colon. At operation performed in November 1918, a large adenocarcinoma of the transverse colon was successfully resected. In February, 1927, the patient returned for re examination. Physical examination revealed a small mass in the right upper quadrant of the abdomen and blood was found in the stools. A ray examination disclosed a filling defect in the distal ascending colon. At a second operation, performed in March 1927, a large tumor mass was discovered. The mass was mobilized and resected together with the ascending colon, part of the terminal ileum and cecum and a portion of the transverse colon. The patient recovered. In October, 1927, he was subjected to a third operation for the relief of obstruction produced by an adhesion band in the abdomen. When last heard from in 1936, he was in good health.

The author concludes that recurring carcinoma of the colon is not always a hopeless lesion. Multiple

malignant lesions of the colon are probably not so rare as is commonly believed. They may occur simultaneously or develop after a period of many years of intervening good health.

JOHN W. NUZUM, M.D.

## LIVER, GALL BLADDER, PANCREAS, AND SPLEEN

Whipple, A. O. Studies in Splenopathy. Introduction. *J. Am. Med. Ass.* 1936, 107, 1775.

At the Vanderbilt Clinic and the Presbyterian Hospital, New York, the splenopathies are studied by a group of physicians and surgeons. The splenopathies associated with specific blood pictures are studied by the group interested in the anemias and leukemias.

The Spleen Clinic is one of several combined clinics. These combined clinics, made up of medical, surgical, pathological, and, in some instances, radiological departments, are engaged in the study of the so called middle ground diseases. The patients referred to them are studied by the group together, the therapy is agreed on, and whether the treatment is medical or surgical, the results are studied and evaluated by the same group.

The Combined Spleen Clinic was organized in 1930. Since then over 200 patients with splenic disease have been studied and followed, and more than 102 spleens have been removed.

It is the opinion of the author that, from the standpoint of the care of the patient, teaching, and research—the 3 cardinal criteria of any clinic worthy of the name—the combined clinic has everything to recommend it. In such a clinic the patients are studied more carefully and the choice of therapy is the result of agreement among medical and surgical workers based on mutual follow up studies. A clinic of this type cannot be dominated by over conservatism or radicalism in treatment.

LOUIS SPERLING, M.D.

## MISCELLANEOUS

Mandillon, G. and Poinot, J. Abdominal Contusions with Multiple Lesions of the Mesenteric-Intestinal Junction. (A propos des contusions de l'abdomen avec lésions multiples des méso-sés d'insertion intestinale). *Rev. de chir. Par.* 1936, 55, 578.

The authors report 3 cases of abdominal injury, resulting in a tear of the mesentery at its point of attachment to the intestine.

The first case was that of a man who was struck by an automobile while riding a bicycle and thrown violently to the pavement on his abdomen. Operation performed eight hours after the accident disclosed multiple tears in the mesentery of the small intestine, erosions of the intestine itself, separation of the leaves of the mesentery in the ileocecal region with intramesenteric hemorrhage, and complete separation of the mesentery from the bowel to an

extent of 30 cm at the level of the sigmoid. The devitalized segment of bowel was exteriorized and resected. The patient died eight hours later still in shock.

The second case was that of a man who was struck on the abdomen by a cask of oil weighing 50 kgm which fell from a height of 4 or 5 meters. Laparotomy performed twelve hours later revealed separation of the jejunum from its mesentery to an extent of 2 meters. This segment of bowel was resected. At a second laparotomy two days later an ileostomy was done, the bowel being distended and matted together. The patient died of peritonitis eight days later.

The third case was that of a man who was kicked in the abdomen by a mule. Operation performed ten hours after the injury disclosed a tear in the wall of the ileum and lower such severe crushing of the mesentery and attached bowel that resection of 20 cm of the ileum was necessary. After end to end anastomosis of the bowel the abdominal cavity was irrigated with normal salt solution and drains were placed in the wound. The patient had a very stormy postoperative course but recovered.

The authors review cases of similar injuries recorded by others since 1902 giving the length of time that elapsed before operation and the final result. Of 70 patients 57 per cent died and 43 per cent recovered following surgical treatment.

From their own experience and that of other surgeons the authors conclude that the prognosis depends mainly upon the time elapsing before operation, the extent of the anatomical lesion and the degree of shock. The injury to the abdominal wall is usually minimal.

At operation a large incision should be made to allow careful inspection of the abdominal viscera. If major injuries to the mesentery are found resection of the involved bowel is usually the safest procedure as by this means the danger of later

hemorrhage, gangrene, stenosis, peritonitis and mesenteric thrombosis is decreased.

JOHN MARTIN, M.D.

McGregor, A. L. Gravity Drainage of Pelvic Abscess. *Brit J Surg* 1935 24 292.

The author points out that rectal or vaginal drainage of an abscess in the pouch of Douglas is not always so simple, safe or satisfactory as many practitioners believe. Of the 10 cases which he treated in this manner, the condition cleared up rapidly and uneventfully in 7, but serious complications occurred in 3. In 1 of the latter extensive extraperitoneal cellulitis developed as the result of spread of the infection through the opened parametric cellular tissue. In the second a loop of bowel which lay free within an abscess cavity prolapsed into the rectal incision. In the third severe cystitis was caused by the extension of infection from the drainage tract through the posterior bladder wall. In all of these 3 cases death resulted. In the first and second it was attributable to the complications resulting from drainage.

The main risks are (1) mistakes in treatment due to faulty diagnosis and (2) injury to the small bowel. The author believes that if the diagnosis of pelvic abscess is the least doubtful, abdominal section should be performed.

He gives the following rules with regard to pelvic drainage:

- 1 Never operate unless the catheter has been passed on the operating table.
- 2 Never drain through any but an opening exactly in the midline.
- 3 Never stitch the drainage material to the anus as this may cause the development of perianal infection.
- 4 Never drain if the abscess bulges into the rectum or vagina on one side only.

ARTHUR S W TROSKOFF, M.D.

# GYNECOLOGY

## UTERUS

Graves, R. C., Kickham, C. J. E., and Nathanson I. T. The Ureteral and Renal Complications of Carcinoma of the Cervix. *J. Urol.*, 1936, 36 618

Ewing states that the natural termination of most cases of uterine cancer is uremia from occlusion of the ureters. Autopsy studies by Wagner, Williams, Faerber, Behney, and others have shown varying degrees of ureteral obstruction in from 65 to 85 per cent of fatal cases. The authors have studied 257 cases of cervical cancer with regard to this condition. Postmortem examinations were made in 87. In the remainder, cystoscopic, retrograde pyelographic, and intravenous pyelographic studies, non protein nitrogen determinations, and phenolsulphonphthalein tests were carried out. Of the 257 cases, 16 were operable and 241 inoperable. Urological symptoms were variable and untrustworthy. Of 139 non protein nitrogen determinations 81 showed values over 40 mgm. per 100 c.c. In 68 cases in which the phenolsulphonphthalein test was done two hour readings were below 20 per cent in 20. The other urological studies revealed a high incidence of ureteral obstruction often associated with dilatation or infection of the kidney pelvis. The incidence of obstruction found at autopsy was 79.3 per cent. The more extensive the disease in the pelvis the higher the incidence of interference with ureteral drainage.

The obstruction is due usually to carcinomatous infiltration and is situated from 4 to 6 cm. above the bladder. The authors believe that in some cases in which marked partial occlusion has already taken place edema following irradiation may precipitate complete obstruction. Occasionally the obstruction is due to late fibrosis.

The authors are of the opinion that not enough attention is paid to the possibility of ureteral obstruction, and that all cases of cervical cancer should be studied urologically from the prognostic and the therapeutic points of view. The treatment of such obstruction may consist of simple dilatation, nephrostomy, ureterostomy, or nephrectomy, depending upon the circumstances. These measures should relieve the pain. DANIEL G. NORTON, M.D.

## ADNEXAL AND PERIUTERINE CONDITIONS

Lundquist B. and Runstrom G. Hysterosalpingography. *Acta obst. et gynec. Scand.*, 1936, 16 415

After reviewing the literature on hysterosalpingography the authors report their experience with this procedure in 55 cases. In 51 of their cases it was used on account of sterility and in 4 for other reasons. They report also a case in which roentgenograms showed injection into the venous system.

According to their experience, hysterosalpingography is extremely valuable. When the indications are carefully considered and the correct technique is used, it is associated with very little risk and yields important information. In the cases of 7 of 28 women with sterility who were free from pathological lesions it proved curative, pregnancy occurring within a few months.

In cases in which pathological changes in the pelvic organs are visible, the authors make the roentgen examination with the patient in the lateral, upright, and upside down positions in addition to dorsal decubitus. This procedure has been found very satisfactory.

Bernstein, P. Tumors of the Ovary. *Am. J. Obst. & Gynec.* 1936 32 1023

In the cases reviewed by the author, the most common ovarian tumors, mentioned in decreasing order of frequency, were simple cysts, dermoid cysts, and papillary serous cancers.

Seventeen and three tenths per cent of the neoplasms were malignant. Of these, 95 per cent were cancers and 5 per cent were sarcomas.

Fifty eight per cent of the patients were between twenty and forty years of age, 30 per cent over forty years, and 12 per cent under twenty years. Sixty seven per cent of the cancers and 70 per cent of the sarcomas occurred in women over forty years of age. Of the total number of ovarian tumors, 31 per cent occurred in the fourth decade of life, 27 per cent in the third decade, and 19 per cent in the fifth decade. Simple cysts were most numerous in all 3 of these decades.

Seventy five per cent of the tumors occurred in married women. Of these, 81 per cent were benign and 19 per cent malignant. Forty three per cent of the married women with ovarian tumors were parous. Thirty per cent of the malignant tumors occurred in parous women.

In 54.3 per cent of the cases menstruation was normal, in 26.5 per cent hyperfunctional bleeding occurred, and in 17.9 per cent there was hypofunctional bleeding. The incidence of dysmenorrhea was only 15 per cent.

In 76 per cent of the cases of ovarian cancer, metastases were found at operation. Eighty per cent of the metastases were due to papillary serous cystadenocarcinomas. Twenty six per cent were found in the gastro intestinal and peritoneal systems, 16 per cent in the genital tract, and 11 per cent in the omentum.

Pain occurred in 75 per cent of the cases, and gastro intestinal symptoms, principally nausea and vomiting, in 10 per cent.

In 18 per cent of the cases with pain, the pain was bilateral. In the others it occurred with about equal frequency on the right and left sides.



Twenty-one per cent of the tumors were bilateral. Forty-four per cent occurred in the right and 35 per cent in the left ovary. Fifty-five per cent of the malignant tumors were bilateral.

Attention is called to the value of the sedimentation test in inflammatory, degenerative, and infectious processes of the ovary.

EDWARD L. CORNELL, M.D.

Van Tongeren F. C. Pseudo Pregnancy Caused by Lutein Cysts (*Pseudo-gravidité par les kystes lutéiniques*) *Gynec et obst* 1936 34 350

The author reports 3 cases of pseudo pregnancy caused by lutein cysts. The first was that of a nullipara twenty-seven years old whose left ovary had been resected one year previously because it was cystic. When the patient consulted the author she stated that since the time of the operation her menstrual periods had been considerably shortened, the flow had been scanty, and she had experienced a sensation of heaviness and congestion in the pelvis. She presented characteristic signs of pregnancy such as a linea nigra, pigmentation of the nipples and areolae, and the secretion of colostrum. On gynecological examination a cystic tumor about as large as an orange was found in the lower left quadrant of the abdomen. The uterus was of normal size and the Aschheim Zondek test was negative. The possibility of an ectopic pregnancy was considered, but one week later the patient had a normal menstrual flow and after one month all the signs of pregnancy disappeared spontaneously. A tentative diagnosis of lutein cyst was made. Operation was not performed.

The second case was that of a secundipara forty-one years of age whose children had been delivered by cesarean section. When seen at the clinic the patient stated that she believed herself pregnant because she had been amenorrheic for two consecutive months. Examination revealed a uterus about the size of a fist. The breasts showed marked hyperpigmentation especially in the region of the areolae, and colostrum could be expressed from the nipples. One month later the patient suddenly began to bleed from the vagina. As a spontaneous abortion was feared she was put to bed and an ice bag applied to the abdomen. The bleeding ceased temporarily, but subsequently recurred at regular intervals. Meanwhile the uterus had reached the level of the umbilicus. During one hemorrhage the patient experienced severe cramps and appeared about to go into shock. At laparotomy the uterus was found enlarged and a cyst about the size of a pigeon's egg was discovered in the left ovary. The uterus was amputated supravaginally and the left adnexa were removed. On subsequent pathological examination of the specimens the uterus was found empty. Microscopic examination failed to disclose any decidua reaction or any malignancy. Sections of the re-

moved ovary showed the presence of typical lutein cells.

The third case presented essentially the same clinical features as the two others.

Concerning the treatment, Van Tongeren states that, when the diagnosis of lutein cyst has been made, surgical interference is indicated only in cases in which there are symptoms indicating mechanical interference or torsion. In the absence of such symptoms the treatment should consist in the administration of ergot, folliculin, or Prolan A to promote menstruation.

RICHARD E. SOMMA, M.D.

## MISCELLANEOUS

Aschheim S. Therapy with Ovarian Hormones (*Therapie mit Ovarialhormonen*) *Tung-Chi* 1936 11 239

The scientific bases of treatment with ovarian hormones are reviewed from the attempts at transplantation made by Knauer to the latest attempts made by Kaufmann at the Berlin Clinic. With the experiment of Kaufmann who with progynon and proluton obtained true cyclic changes in the uterus of a castrated woman, a conclusive stage seems to have been reached in the experimental investigation of ovarian hormones.

In this article Aschheim reports for the first time his own results from the therapeutic use of ovarian hormones. In the cases of women with menopausal symptoms after physiological or operative termination of ovarian function good results are occasionally obtained with medium sized doses, but sometimes only after the injection of 4 doses of 50,000 mouse units of progynon. Women who have been sterilized by roentgen irradiation for myoma or metrorrhagia should not be given ovarian hormones as the purpose of the roentgen irradiation was to place the ovaries at rest. Ovarian hormones have a favorable effect on arthropathies and neuralgias as well as kraurosis vulvae, acne rosacea, and psoriasis.

In amenorrhea the results of treatment with ovarian hormones are best when there is no marked hypoplasia of the uterus. In the presence of pronounced uterine hypoplasia only very large doses of progynon given over a period of several months will be beneficial and permanent cure is not to be expected. The author believes that ovarian hormone treatment finds its chief indication in cases of secondary amenorrhea. In oligomenorrhea he gives 1,000 mouse units by mouth in the first half of the cycle. The combination of progynon and proluton yields better results. Proluton alone is indicated only in cases of habitual abortion and persisting follicle. In treatment with large doses the author sees unquestionable progress which would be impossible with small doses.

(H. SIEGMUND) LEO A. JERNE, M.D.

# OBSTETRICS

## PREGNANCY AND ITS COMPLICATIONS

Masramón A and Pecorone R The Qualitative and Quantitative Friedman Reaction (Friedman cualitativa y Friedman cuantitativa) *Semana med* 1936, 43 1393

The authors give a comprehensive and critical discussion of the qualitative diagnostic reactions for pregnancy, the history of the development of the quantitative methods and the advantages and disadvantages of each and the Brindeau Hinglais scale of hormonal concentration. They conclude that qualitative reactions are insufficient to differentiate between normal pregnancy, pathological pregnancy, and other conditions capable of producing a positive hormonal reaction. Only quantitative methods, in which the rabbit is the reacting animal as first developed by Friedman, are practical for general use. Friedman's test is an important advance both in simplification of technique and facility of interpretation. Of the 3 different rabbit-units proposed by as many investigators, the authors regard the Brindeau Hinglais (1932) unit as the simplest and most reliable. This is the smallest dose of hormone which, injected intravenously into a rabbit weighing 2000 gm produces at least 1 hemorrhagic point in the ovary.

The authors amplify the Brindeau Hinglais scale somewhat to include the findings of other investigators. They state that it is in the transitional areas between the well defined zones where further study, minute comparison between clinical and laboratory data, repetition of tests, and prudent diagnosis are indispensable.

Reference is made to 90 cases in which the authors used the Brindeau Hinglais method except that, in order to simplify the technique, they employed urine instead of serum. The results agreed with those of Brindeau and Hinglais. Most of the tests were for conditions other than suspected early pregnancy and will be reported elsewhere, but a few histories of special interest are cited. Attention is called to a group of cases which demand further study: those of pregnancy with metrorrhagia and a high hormonal concentration but without toxic symptoms. Hydatidiform mole was suspected, but was not found although there was marked proliferation of the chorionic epithelium.

The authors present graphs, tables, a photograph, and a bibliography. M E MORSE, M D

Frankl, O Placental Cysts (Ueber Placentacysten) *Ztschr f Geburtsh u Gynaek*, 1936, 113 190

The increase in our knowledge of the genesis, structure, and function of the placenta demands that previous theories regarding the structure and development of placental cysts be brought into harmony with the newer teachings.

The author describes 4 placentas with 1 or more cysts. He states that the site and origin of placental cysts are not uniform. Such cysts may develop even from dilated chorionic villi. Most of them occur beneath the chorion and lift the amniotic layer into the amniotic cavity. Histological study of such cysts shows that, beneath the chorionic membrane, there is a border of trophoblast cells surrounding the cyst, usually with multiple layers, from which clumps of cells protrude into the lumen of the cyst. The base and side walls of the cyst consist of liquefied and fibrinoid degenerated trophoblast. Liquefaction and fibrinoid degeneration occur in every placenta normally, especially where there is a piling up of trophoblast. Such piled up areas are represented by the septa, the intervillous nodules, and the subchorionic cell islands. The greater frequency of cyst formation in the subchorionic islands is due to the fact that the mechanical relationships in the basal and middle layers of the placenta are quite different from those in the subchorionic layers, and to the direction of the blood stream to which attention was called by Spanner and the relative paucity of villi in the subchorionic layers. While the author admits the possibility of cyst formation from the chorionic layer, he doubts that it is frequent.

(FRANKL) LEO A JUNKE, M D

Crosman A M An Experimental Study of the Dissolution and Absorption of Retained Dead Fetuses *Am J Obst & Gynec* 1936 32 964

Crosman describes an experimental method for study of the retrogressive changes which occur in retained dead fetuses in the rat. The initiation of the retrogressive changes in the dead fetus occurs early, within twelve hours after death. The respective rates of dissolution of most of the formed elements of the fetus are uniform up to twenty-four hours. At the end of that length of time variation becomes apparent.

Aside from described exceptions, the fetal structures in fourteen day rat embryos showing the greatest amount of dissolution and mentioned in order of decreasing degree of the change are the capillaries, epidermis, ear, lens, retina, brain, esophagus, stomach, gonads, anterior spinal cord, metanephros, posterior spinal cord, intestines, liver, sclerotome and heart, and precartilage.

Two types of dissolution are described as quite apparent in the early stages of retention: the "loose" and the "condensed." In the later stages the distinctive characteristics of these types become gradually obscured.

Evidence of a chemotactic influence of the retained material toward leucocytes of maternal origin during the early stages of retention is presented. This chemotaxis is not apparent in the later stages.

In conclusion the author states that it is possible for a rat to become pregnant and to produce normal young while retaining a dead fetus

EDWARD L. CORNELL, M.D.

Renard G. Ocular Disturbances in Pregnancy  
(Troubles oculaires de la grossesse) *Gynec et obst*  
1936 34 337

Renard believes that the eye reacts peculiarly to humoral nervous and vascular disturbances arising during pregnancy because of its vascularity and its innervation. In general ocular disturbances associated with gestation may be classified according to the time of their appearance after conception. In early pregnancy they are probably due to toxic or nervous causes whereas after the fourth month they are caused by more serious factors.

During the first stage of pregnancy, the most common ocular disturbances are slight fatigue and the appearance of spots before the eyes. In about 83 per cent of cases the sensitivity of the retina to light has been found altered. Other disturbances are of sympathetic origin. There is a slight vagosympathetic instability manifested by tachycardia, instability of the arterial tension and inversion of the oculocardiac reflex. Some women develop a slight myopia of from  $\frac{1}{4}$  to  $\frac{1}{2}$  diopter. Another group experience more or less difficulty in reading and suffer from disturbances of accommodation and from hippus. Other conditions are paralysis of the extrinsic musculature of the eye and disturbances of convergence. In these complications the nucleus of the oculomotor appears to be involved. In some cases the eyelids become pigmented whereas in others there is a diminution of the visual fields with bitemporal hemianopsia.

In the second half of pregnancy other ocular disturbances are apt to develop. In the last few years there have been several reports of the occurrence of papilledema, venous stasis and peripapillary hemorrhages without impairment of visual acuity. The fact that these conditions disappeared following lumbar puncture proves conclusively that they are due to increased pressure of the cerebrospinal fluid.

In the majority of cases of eclampsia retinal lesions occur. The most common is a retinitis of pregnancy which usually makes its appearance during the last four months. This is characterized by papilledema with venous dilatation, peripapillary hemorrhages and white spots. It differs from albuminuric retinitis by absence of the white exudates disposed in a star like fashion around the macula which are present in the latter condition. The retinitis of pregnancy usually has a poor prognosis as it almost always accompanies eclamptic convulsions. When this is the case the pregnancy should be interrupted.

During the last few months of pregnancy some women develop an amaurosis due probably to involvement of the visual cortex. The prognosis of this condition is usually good. Cases of optic neuritis of pregnancy have been reported.

During labor several visual disturbances may occur. The most important is a pulsating exophthalmos. This is due to an arteriovenous aneurysm in which the internal carotid artery communicates with the cavernous sinus. Its most common causes are labor and skull fracture. Its prognosis is very poor.

Most ocular disturbances occurring in the puerperium are due to infection. The most common is an endochoroiditis which develops usually from an old infection.

RICHARD E. SOMMER, M.D.

Schumann E. A. Observations upon the Hemorrhage of Pregnancy. *New England J Med* 1936 215 811

From the standpoint of etiology and treatment the various types of uterine bleeding which occur during pregnancy must be classified according to the trimester in which they appear.

In the first trimester by far the most common cause of hemorrhage is threatened or inevitable abortion. Next in order of decreasing frequency are ectopic pregnancy, hydatid mole, persistence of menstruation, menstruation from one horn of a double uterus, uterine polyps, cervical erosion, and carcinoma.

The hemorrhage in abortion may be copious but the author has never seen a fatality after this accident which could be ascribed to the hemorrhage alone. The differentiation of an incomplete or threatened abortion from ectopic pregnancy is often difficult. Of great importance in distinguishing an intra uterine from an extra uterine gestation is a carefully taken history. In the treatment of abortion curettage is not often necessary but may be required in the presence of persistent bleeding. General supportive measures are usually sufficient. However the author frequently packs the vagina with gauze or cotton under precautions for an *æpsis* and allows the pack to remain in place for twenty-four hours. On removal of the gauze the products of gestation are frequently found free in the vagina. In the management of ectopic pregnancy prompt laparotomy upon establishment of the diagnosis is the usual rule.

Hydatid mole can usually be diagnosed without difficulty. Its treatment consists of prompt and complete removal of the mole preferably by abdominal hysterotomy under local anesthesia or by way of the vagina. Periodical Friedman tests are an essential part of the follow up because they permit early recognition of a complicating chorion epithelioma.

In the second trimester abortion still takes the lead as a cause of hemorrhage but after the fifth month placenta prævia must always be uppermost in the mind of the obstetrician. The classical sign of placenta prævia is painless bleeding. This is often slight at amount at the first attack but usually there are irregularly recurring hemorrhages of increasing severity. The diagnosis of placenta prævia in the second trimester of pregnancy presents con-

siderable difficulty. Under these conditions the method of differentiation described by Ude and Urner is of value. This method consists in instilling about 40 ccm of a 12½ per cent solution of sodium iodide into the empty bladder. In normal pregnancy the presenting head lies almost in contact with the bladder and the space between it and the bladder margin appears to be from 6 to 8 mm wide. In placenta prævia the mass of the placenta, with its concave border upward, lies between the fetal head and the bladder, separating them by a space of varying width. As there is no expectant treatment of placenta prævia the pregnancy should be terminated as soon as the diagnosis is made. Whether this should be done by abdominal hysterotomy or by the induction of labor depends upon the degree to which the placental mass covers the cervical canal. If the child is viable, the problem is different and undoubtedly the best prognosis for the mother and infant is offered by cesarean section.

In the last trimester of pregnancy placenta prævia and premature separation of the normally implanted placenta are the chief causes of uterine bleeding. Abruptio placenta is characterized by hemorrhage which is not necessarily copious, but is always associated with pain of a more or less severe type. It is a serious complication. Both the maternal and the fetal mortality are exceedingly high. The only treatment is immediate delivery, by way of the vagina if the cervix is sufficiently dilated to permit forceps extraction, or by abdominal hysterotomy. When abdominal hysterotomy is necessary the uterus is often found so infiltrated with blood that hysterectomy must be done.

Blood donors should be secured promptly for every woman who bleeds during pregnancy, and transfusions should be given early and repeated as often as necessary. GEORGE H. GARDNER, M.D.

Dieckmann, W. J. Blood and Plasma Volume Changes in Eclampsia. *Am J Obst & Gynec*, 1936, 32, 927.

A concentration of the blood which may be relative (below the average for the period of pregnancy) or absolute (less than the normal for the non pregnant woman) occurs in eclampsia. This can be demonstrated by blood and plasma volume determinations, but is demonstrated best by serial determinations of the hemoglobin, cell volume, or serum protein concentration. The change in concentration of these substances is not always parallel, but the direction of the change is usually the same.

While concentration of the blood and plasma is not the cause of eclampsia, it is intimately associated with the convulsions, coma, oliguria, and the various cerebral, visual, and gastro intestinal symptoms of the condition. Blood dilution is associated with clinical improvement manifested by diuresis, cessation of the convulsions, restoration of consciousness, and a decrease in the temperature and pulse rate. In 3 cases in which a permanent blood dilution could not be maintained death resulted.

Since the cause of eclampsia is unknown and the condition is accompanied by a concentration of the blood which may be so marked as to be incompatible with life, treatment which will dilute the blood should be instituted. Innumerable methods of treatment have been used. If the condition is mild, almost any type of treatment, provided it has no mortality of its own, is efficacious. If the condition is severe, treatment which comprises control of the convulsions, dilution of the blood, and relatively early delivery must be instituted.

EDWARD L. CORNELL, M.D.

Peters, J. P., Lavietes, P. H., and Zimmerman, H. M. Pyelitis in the Toxemias of Pregnancy. *Am J Obst & Gynec*, 1936, 32, 911.

It has long been recognized that elimination of urinary infection in the presence of obstruction of the urinary tract is difficult, if not impossible, and there is no reason to believe that in this respect a physiological obstruction is more benign than a pathological obstruction.

Of 320 patients with toxemias of pregnancy, 41 were found to have pyelitis. Of 25 with vascular or renal disease first manifested in pregnancy, autopsy revealed pyelitis and hydronephrosis or their sequelae in 11. Of 93 with pyelitis complicating pregnancy, 25 developed hypertension or edema or both before termination of the pregnancy. The authors give their reasons for the belief that pyelitis in these patients was a major factor in the production of the toxemia. EDWARD L. CORNELL, M.D.

## LABOR AND ITS COMPLICATIONS

Caldwell, W. E., Moloy, H. G., and D'Esopo, A. The Role of the Lower Uterine Soft Parts in Labor. *Am J Obst & Gynec*, 1936, 32, 727.

The lower uterine segment and its fascial supports represent an active force determining the axis along which the fetal head descends through the pelvis. The maximum guiding influence of the lower uterine segment becomes evident only after definite dilatation of the cervix.

The position of this axis is variable. The authors describe examples of descent through the forepelvis, the mid pelvis, and the posterior pelvis.

The clinical course of labor and the position of the head in relation to the type of pelvis depend upon the axis followed by the head. As the axis through which the head can descend depends upon the active forces of labor, the possibility of determining this axis accurately by roentgen examination is greater the later the examination is made.

The authors believe that knowledge of the variations in the fetal axis of descent will ultimately lead to an understanding of inertia and cervical dystocia and to correct treatment of these conditions.

When labor does not progress normally a careful examination should be made to determine whether the head is descending in proper relation to the symphysis in front or the sacrum behind. Because

of the variability of the fetal axis of descent and its effect on the mechanism of labor difficulty in labor cannot be foretold from linear or volumetric measurements alone

In the discussion of this report PLASS said that he found it difficult to believe that the soft tissues alter the position of the head. In his opinion the position of the soft parts that is, the lower uterine segment is more likely to be determined by the configuration of the bony canal. He stated that in the unilateral lameness pelvis the head accommodates to the change in the bony pelvis irrespective of the soft parts. Under the influence of the changes induced by pregnancy all malpositions of the uterus including both the cervix and the body tend to disappear.

ALDRIDGE stated that he regarded it as doubtful whether the lower uterine segment remains sufficiently fixed in position as labor progresses to constitute an important factor directing the course of the fetal head.

EURENSTEY and FARRAR said that in their opinion Caldwell is correct in assuming that the fascial attachments of the lower pole of the uterus influence the fetal head in its descent through the pelvis.

EDWARD L. CORNELL, M.D.

## PUERPERIUM AND ITS COMPLICATIONS

Vagedes M. B. Urinary Retention in the Puerperium. *Leber puerperale Is. huret* 1913, *Muenster* 11. Retention

Of 1000 puerperal urinary retention occurred in 70 (10.14 per cent). In those with spontaneous deliveries its incidence was 0.53 per cent and in those with operative deliveries 4.78 per cent.

As puerperal ischuria the author designates urinary retention which occurs immediately or shortly after delivery in the absence of previous genito-urinary disease. There are 2 types (1) in complete ischuria in which spontaneous micturition occurs sooner or later but some urinary retention is always present and (2) complete ischuria in which there is complete inability to urinate. The cause of the condition is a disturbance in the reflex arc between the normal sensations of bladder fullness and emptiness. This disturbance is due to the pressure of the child's head on the bladder and the sacral nerves during delivery. In addition there are contributory factors such as the increased capacity of

the bladder with consequent delay of the sensation of bladder fullness the diminished elasticity of the musculature of the bladder wall and possibly wound pain. Every case in which conservative measures do not obviate bladder catheterization in an average of from twenty six to thirty hours after delivery is considered a case of ischuria. Schroeder's expression of the bladder is rejected because it is considered dangerous. Of the 70 cases which were observed, 3 could be explained on the basis of Esch's theories regarding the cause of puerperal urinary retention. In 19 cases the urinary retention followed the use of forceps with episiotomy in 2 cases extraction with perineal injury in 3 cases version and extraction in 3 cases, manual aid in delivery and in 27 cases episiotomy and tearing of the perineum. In 3 cases, there was labial and vulvar edema, in 1 case a labial hematoma in 4 cases disproportion between the fetus and the pelvis and in 1 case diastasis of the recti. In the remaining 7 cases the ischuria was due to an increase of the influences which under normal conditions delay the emptying of the bladder physiologically. Psychic influences and puerperal changes inhibit the impulse which relaxes the sphincter.

Cystitis was present in 10 of the 70 cases of ischuria and in 7 was due to catheterization.

(FARRE KÖCH) JACOB E. KLEIN, M.D.

Bager B. Is the Sedimentation Reaction of Any Practical Importance in Complications During the Puerperium? *Acta obst. et gynec. Scand* 1930 16 387

The author studied the Fabraeus sedimentation reaction in the cases of 401 women immediately before and one week after delivery to determine whether this reaction is of any value in estimating complications arising during the puerperium. About half of the women were normal and the other half in various respects pathological.

The physiological variations in the sedimentation reaction were found to be exceedingly marked and capricious both before delivery and during the first week of the puerperium. The reaction varied considerably also in apparently similar pathological cases. The author therefore concludes that the sedimentation reaction in the first week of the puerperium is of practically no value when it can be compared with the reaction immediately before delivery.

# GENITO-URINARY SURGERY

## ADRENAL, KIDNEY, AND URETER

Char, G. L., Shih, H. E., and Wen, I. C. Duplication of the Kidney and Ureter. *J. Urol.*, 1936, 36 305

The authors report 14 cases of duplication of the kidney and ureter and discuss the pathology, symptomatology, diagnosis, prognosis, and treatment of these anomalies. During the period from December 1930, and March, 1936, 12 cases of duplication of the kidney and ureter were diagnosed on the urological service of the Peiping Union Medical College Hospital. In no case was the anomaly bilateral. The ratio of male to female subjects was 1:5.

The general belief that malformation predisposes to disease was found to be true in 7 of the cases reported. Stone and bacterial infection were found in 4 cases each and a tumor in 1 case. In none was tuberculosis discovered. In 2 cases the complicating pathological lesion—stone in one case and tumor in the other—was found, not in the ectopic kidney, but in the true kidney. Either ureter may become obstructed by virtue of its position in relation to the surrounding structures.

The subjective symptoms depend upon the pathological changes and are usually referable to stasis, infection, stone, or ectopic insertion of the ureter. Pain is an outstanding symptom. Tumor may cause hematuria.

These conditions are usually diagnosed on cystoscopic examination with accompanying pyeloureterography. In the female, incontinence of urine in spite of otherwise normal bladder function is pathognomonic of ectopic ureter. The prognosis of this condition is determined largely by the pathological character of the complicating lesion. The treatment must necessarily depend upon the urgency of the symptoms. The inconvenience may or may not be sufficient to warrant surgical intervention.

Among the cases reported by the authors were the following 6:

Case 1. A woman twenty-nine years of age gave a history of repeated attacks of pain in the left loin for three years and of the passage of small stones from the urethra six months prior to her admission to the hospital. Cystoscopic studies disclosed an ectopic kidney joined to the upper pole of the left kidney, and kinking of the ectopic ureter. Under ether anesthesia the ectopic kidney and ureter were re-

The result was good, and there has been no symptoms.

The patient was a woman thirty-seven years of age who had frequent attacks of pain in the left loin. An excretory urogram showed an ectopic ureter on the right side. Heminephrectomy and removal of the ectopic kidney and ureter by normal convalescence. There has been no recurrence of the symptoms.

Case 3. A woman thirty years of age complained of a dull aching pain in the left groin associated with frequency from which she had suffered for four years. Cystoscopic and urographic studies revealed complete duplication of the left ureter and kidney. A left heminephrectomy with removal of the ectopic kidney and ureter was followed by uneventful convalescence and a satisfactory end result.

Case 4. The patient was a woman thirty-nine years old who, for three years, had had intermittent attacks of cutting pain in the lower part of the abdomen associated with nausea, vomiting and collapse. Four and a half years before she was seen by the authors one small stone had been expelled through the urethra. Five months previous to her examination by the authors a cystostomy with removal of bladder stones was done, but stones in the left ureter could not be reached. The patient was referred to the authors for ureteral calculus. X-ray studies showed duplication of the left ureter with stones in the dilated distal portion. Under spinal anesthesia the old operative scar was opened up, the left ureters were located, and the stones were removed. Post-operative convalescence was uneventful except that the presence of colon bacilli in the urine from the left ureter necessitated kidney lavage.

Case 5. The patient was a woman thirty-eight years old who stated that in 1928 she had passed a pea-sized stone and the next day suffered severe pain in the left flank which radiated to the left inguinal region and was accompanied by nausea and vomiting. X-ray examination showed stones in the bladder as well as in the left kidney. During the following two years 7 or 8 stones were passed. The stone in the ureter was removed, but the bladder stone was not touched. When the patient was examined by the authors a palpable left kidney, cystitis, and secondary anemia were found. X-ray examination revealed one stone in the bladder and one in the left kidney. An excretory urogram showed a bifid renal pelvis and complete duplication of the ureters. As the normal kidney had been damaged by the presence of a stone in the lower portion of the ureter it was decided to remove that kidney and leave the ectopic kidney and ureter. Convalescence was uneventful except for the occurrence of a pyogenic infection. This was readily controlled by acetic acid irrigations.

Case 6. A woman twenty-one years of age gave a history of constant dribbling of urine as far back as she could remember. She was obliged to wear a perineal pad constantly although she voided normally at regular intervals. On cystoscopic examination the bladder and ureteral orifices appeared normal. In the search for an ectopic ureteral orifice a small opening was found in the vagina to the right of the cervix. The injection of sodium iodide showed complete duplication of the right renal pelvis and ureter.

Heminephrectomy and partial excision of the ectopic ureter resulted in complete cure of the incontinence.

Case 7 The patient was a girl fifteen years old who had had repeated attacks of hematuria for two and a half years. A firm globular mass which moved very little on respiration was found in the upper part of the abdomen on the right side. A pyelogram showed duplication of the right renal pelvis with evidences of tumor in the lower portion. As there were metastases about the tumor nephrectomy was done. The postoperative convalescence was good, but recurrence and death resulted four years after the operation. The pathological diagnosis was papillary carcinoma.

The article is concluded with the following summary:

Fourteen cases of duplication of the kidney and ureter are reported.

The pathology symptomatology diagnosis prognosis and treatment are discussed.

It is pointed out that in spite of the general belief that the upper ectopic segment is usually the site of disease a complicating lesion may be found in either the ectopic or the normal segment of the kidney.

From clinical and embryological studies it is concluded that as long as there are proper connections between the supernumerary kidney and its ureter the kidney is capable of functioning like the normal organ.

The findings in the reported cases tend to support the view that these anomalies develop as the result of a separate outbudding from the mesonephric duct or as a bifurcation of the original ureteral bud rather than from persistent mesonephric tubules and duct as claimed by Spitzer Wallin and Kraft.

CLAUDE D HOLMES M.D.

Desjardes R and Boileau A. Large Infarcts of the Kidney (Les gros infarctus du rein). *Lyon chir* 1936 33 643.

Despite the fact that renal infarction has been described in detail from the anatomical pathological and etiological viewpoints it has rarely been diagnosed during life. Since it was first described by Rayer comparatively few complete clinical or anatomical observations have been published.

The authors review 34 cases collected from the literature and report a case of such infarction in a man fifty two years old who was suffering primarily from diffuse syphilitic aortitis.

The microscopic picture of partial infarction of the kidney is that of a grayish triangle with its base toward the capsule and its apex toward the hilus. This island of tissue is sharply limited and surrounded by a reddish congested zone. The condition occurs more frequently in the left than the right kidney, but frequently both kidneys and the spleen are involved.

Massive infarction due to complete obliteration of the large vessels produces a rapid increase in the size of the kidney followed by a return to its normal size within a few days and subsequent gradual atrophy.

The authors describe in detail the histological appearance of the infarcted areas both in the central portion and in the congested peripheral zone which is subdivided into a cellular and a vascular area. They describe also the progressive changes from the acute stage to the final cicatrization.

In experiments on animals in which the renal vein on one side was ligated, 60 per cent of the animals died in from one to three days. In the remainder examination revealed a collateral venous circulation which however, was not always sufficient to prevent necrosis of the renal parenchyma. Ligation of the renal artery after a short period of hyperemia produced acute anemia rapid necrosis, and massive atrophy.

Obliteration of the vessels may be brought about by (1) embolism, which is the most frequent cause (2) thrombosis, or (3) spasm (debatable).

Disease of the heart and aorta (endocarditis, myocarditis aortitis aneurism) disease of the peripheral vessels acute and chronic infections (dysentery diarrhea, puerperal infection) traumatism and neoplasms may cause renal infarction.

The most common symptom of the condition appears to be pain. The pain may be excruciating or negligible. It is usually lumbar less frequently abdominal. The urine is often decreased in amount and contains albumin. Less often it contains blood and casts. It rarely shows white cells. In 7 of the cases reviewed a mass was felt in the lumbar region. Vomiting and shock are very frequent signs. The temperature is at first normal but rises in a day or two.

The authors describe 3 clinical types of cases: (1) those presenting the complete syndrome—pain anuria or oliguria albuminuria and other secondary signs (2) those of the pseudo-nephritic type with radiating pain and vomiting or of the peritoneal type with pain vomiting shock and abdominal signs, and (3) those in which the syndrome is incomplete—one group with pain and another with albuminuria as the only manifestation of the condition.

Renal infarction should be suspected when sudden violent lumbar pain with hematuria or other symptoms occurs in persons suffering from a condition that is capable of producing emboli. It must be differentiated from gastric crises lead colic mesenteric thrombosis splenic infarction acute ileus acute pancreatitis perforation, disease or abnormality of the ureter floating kidney, acute nephritis pyelonephritis, pyonephrosis, hydronephrosis and renal carcinoma.

In the cases of small infants the prognosis is usually good but depends upon the primary cause. Massive infarction followed by anuria is frequently fatal.

The treatment is symptomatic. It should be directed toward relief of the pain the re-establishment of urinary function, and the relief of heart failure. Nephrectomy is permissible after complete urological examination if the affected kidney has

ceased to function. In cases in which nephrectomy is impossible and those in which a large infarct is causing pain but there is still considerable renal function decapsulation may be done.

MARSH W. POOLE, M.D.

Campbell, M. F. Vascular Obstruction of the Ureter in Children. *J. Urol.* 1936 36 366

Campbell reports 18 cases of vascular compression of the ureter in children. He states that the condition is not uncommon. The vessels which produce the obstruction are congenitally anomalous. The important pathological feature is hydronephrosis which usually becomes infected sooner or later. The most common symptoms and signs are pain in the region of the kidney, pyuria, hematuria, a mass in the loin, and, with the advent of infection, fever. In the presence of infection a mistaken diagnosis of chronic pyelitis is often made. In its absence the findings of urinalysis suggest chronic interstitial nephritis. The diagnosis is made by urography.

The only treatment is surgery. If the kidney has not been destroyed, conservative surgery may have gratifying results. However, as the correct diagnosis is often delayed, nephrectomy is frequently necessary.

HENRY L. SANFORD, M.D.

### BLADDER, URETHRA, AND PENIS

Langworthy, O. R., Dees, J. E., and Lewis, L. G. Abnormalities of Micturition Due to Syphilis of the Nervous System. *Am. J. Syphilis*, 1936, 20 364

The authors discuss some of the factors related to micturition in tabetic bladder, report their experimental studies with regard to the neuropathology of this condition, report a case with vesical crises, and discuss other types of bladder abnormalities due to syphilis of the spinal cord.

Recently they made a graphic study of the filling of the bladders of over 200 patients with injuries of the nervous system. They found that involvement of certain groups of cells and fibers produced changes in the graphic records which were typical of the injury. This classification is obviously an anatomical one, and syphilis may produce any of these distinctive types of disturbance.

Before graphically studying the vesical abnormalities of tabetic bladders they made a graphic study of the bladders of a number of individuals with no disturbances of micturition and no abnormalities of the nervous system. They then attempted to reproduce the bladder changes associated with tabes in 30 female cats. To cause enlargement of the bladder following posterior root section they found it necessary to cut the second, third, and fourth sacral roots bilaterally. This operation was followed by complete urinary retention and a slow progressive increase in the size of the bladder due to the accumulation of urine which could not be expelled. Over slow incontinence began after the fourth to the sixth day. Experiments have shown that section of the

posterior lumbar roots has no effect upon the capacity of the bladder or upon normal micturition. The loss of tone in the muscle following section of the posterior sacral roots did not lead to vesical enlargement at once. The enlargement occurred gradually. Passive emptying of the bladder at frequent intervals postponed it. The smooth muscle of the bladder is similar to striated muscle in that it responds to stretch by reflex contraction. Its normal activity is dependent upon the integrity of a primary reflex arc. In tabes the afferent fibers entering the lower portion of the cord are damaged early, and the presence of vesical symptoms is not surprising. While the afferent fibers of bladder sensation lie in the lateral rather than the posterior columns, they fail to transmit the sensation of bladder distention because of the damage to the posterior roots. Therefore the patient is unaware that the bladder is filled.

In tabes, bladder symptoms such as hesitancy, feebleness of the stream, incontinence, frequency, and retention are present in from 80 to 90 per cent of cases. There may be a feeling that the bladder is not being emptied completely. Incontinence is noted only on sudden exertion such as coughing. Once infection occurs in a bladder so affected it is extremely difficult to control. Severe lancinating pain in the bladder, vesical crises, occur as the result of irritation of the posterior sacral roots carrying vesical sensation. Absolute retention and absolute incontinence are rare. These vesical symptoms are dependent upon failure to recognize bladder distention due to injury of sensory nerve fibers. There is some evidence that, in tabetics, there is a disturbance of sensation in the wall of the bladder, the response to pain and thermal sensation is lost. The amount of residual urine has a certain relationship to the loss of pain sensibility. After section of the posterior spinal roots tone is lost in striated muscle supplied by those roots and the deep reflexes cannot be obtained. However, this immediate loss of tone could not be demonstrated in the bladder experimentally.

The case reported by the authors was that of a man who suffered from urinary incontinence both day and night. By extreme abdominal straining the patient was able to void small amounts of urine in a small weak stream. The bladder pressure was 2 cm. when the bladder was empty, 4 cm. when it contained 50 c.c.m. of urine, and below 8 cm. when it contained 1,000 c.c.m. of urine. The patient was able to develop a pressure of 60 cm. by making every effort to void, with great abdominal contraction, but was unable to sustain it.

The authors report also 3 cases of tabetic bladder in which, under antiluetic treatment for a number of months, the ability to empty the bladder improved and the appearance of the graphic record approached normal.

Vesical crises are relatively uncommon, but there is hyperesthesia of the posterior urethra or of the floor of the bladder. The pain may be so severe



that it is controlled by sedatives only with difficulty. The external sphincter of the tabetic bladder offers considerable resistance to the passage of a catheter and is often referred to as the spastic external sphincter. In 1926 Myers suggested that the loss of tone in muscles and ligaments allows the bladder to sag and causes a kink in the urethra in its membranous portion.

Tabetic bladders have a characteristic fine fibrillar type of trabeculation somewhat resembling the papillary muscles of the heart. These trabeculations do not appear on the trigone or in the dome of the bladder. Barney suggests that the trabeculation may be recognized before there are any symptoms of vesical dysfunction. Kolb noted that the rhythmic ureteral spurts of urine are sluggish or absent.

The deaths of many tabetics may be attributed directly to vesical infection. In the early stages of the disease if the bladder is not infected the patient may be entirely relieved by vigorous antilutic therapy. Bladder instrumentation should be avoided. However Barney contends that the residual urine should be removed daily with a catheter as any infection which develops will be mild and he advises the use of urinary antiseptics throughout the remainder of the patient's life. Function is improved by reeducation similar to the Fraenkel exercises for the legs.

Section of the sympathetics to improve vesical function in cases of tabetic bladder is still in the experimental stage. Damage to one or both cortico-spinal tracts produces characteristic changes of micturition. Although tabes is the most common cause of syphilitic damage to the cord there are cases in which the lesions are dependent upon thrombosis of spinal arteries or meningomyelitis or both.

CLAUDE D. HOLMES, M.D.

Heitz Boyer, M. Lesions of the Neck of the Bladder in the Female (La maladie néoformante du col de la vessie chez la femme). *J. urol. med. et chir.* 1936 42 216.

The author reviews his fifteen years' experience in the diagnosis and treatment of lesions of the female urethra. He deplors the fact that physicians including urologists have been so reluctant to recognize urethral lesions as a cause of persistent and recurrent vesical irritability in women.

He designates vesical irritation due to such a cause as cystitis with a clear urine or mechanical cystitis. In many cases the diagnosis can be made on the basis of a history of recurrent vesical distress with negative urinary findings. The 3 local symptoms are frequency, pain in the region of the bladder or urethra and nocturia. One of the chief general symptoms is nervousness which may progress to the point of a psychosis.

A urethroscope developed by the author is described in detail. It has a flexible tip to facilitate its introduction. A double fenestra with a rotating observation telescope makes possible inspection of opposite urethral areas without rotating the entire

instrument. The author describes also oblique and retrograde lenses and appropriate electrodes for destruction of the urethral lesions.

He discusses in detail the following lesions of inflammatory origin occurring in the deep urethra: (1) pedunculated and sessile polypoid masses; (2) cysts; (3) edematous lesions, which may be hard with saw like edges, or soft, forming bulbous vesicles; (4) angiomatous or pseudo-angiomatous lesions which project only slightly; and (5) minute abscesses.

He states that more than one lesion may be present. He emphasizes that these lesions can be diagnosed accurately only by careful urethroscopic examination. The urethral examination should include careful inspection of the distal urethra where infected pockets, infected Skene's ducts or a hidden caruncle may be the cause of bladder irritation. Routine investigation of the kidneys by excretory urography in cases of bladder irritation may prevent serious diagnostic error. Renal and urethral lesions may be associated with lesions in the urethra. Bladder function may be seriously affected also by urethrocele and cystocele.

As treatment of such lesions the author recommends their destruction with a weak coagulating current. He believes that this treatment is much more efficacious and yields more permanent relief than the application of silver nitrate. He cautions against the use of too strong a current. For certain cases he recommends a method of electrical curettage of the deep urethra. In nearly all of his cases fulguration was followed by the use of an indwelling catheter for from five to seven days or longer. Relief of symptoms may be immediate or delayed for several weeks. The ultimate results are very gratifying.

LEANDER W. KIMB, M.D.

Bothe, A. E. Roentgen Therapy in the Treatment of Bladder Tumors. *J. Urol.* 1936 36 643.

Bothe discusses results of preoperative roentgen therapy in 2 cases of benign papilloma, 16 of papillary carcinoma and 4 of infiltrating carcinoma of the urinary bladder. He states that accurate localization of the tumor is important. This may be accomplished by cystoscopic and pneumocystographic studies. The number of r units to be given through each of the 6 portals is discussed.

In the reviewed cases the amount of regression occurring under the irradiation treatment was encouraging. Bothe concludes that preoperative roentgen therapy, although making operation more difficult, will probably reduce the incidence of tumor recurrence.

FRANK M. COBBENS, M.D.

# MISCELLANEOUS

Helmholz, H. F. and Osterberg, A. E. The Rate of Excretion and Bactericidal Power of Mandelic Acid in the Urine. *J. Am. Med. Ass.* 1936 107 1794.

The authors report their findings with regard to the rate of excretion of mandelic acid following its

oral ingestion by man and the intravenous injection of its sodium salt into dogs. They present also their observations regarding the concentration of acid and the pH necessary for the urine to possess bactericidal activity against numerous strains of organisms isolated from the urine of individuals with infections of the urinary tract.

The first series of experiments was carried out with urine from patients who received sodium mandelate. The concentration of mandelic acid in the urine varied from 0.25 to 1.1 per cent. It was found that at a pH of 5.0, a concentration of 0.25 per cent of mandelic acid is bactericidal for most organisms, at a pH of 5.3, a concentration of 0.5 per cent is bactericidal and at a pH of 5.7, a concentration of 1.0 per cent is bactericidal. Just as is true of the bactericidal action of beta oxybutyric acid, the lower the pH the lower the concentration of mandelic acid necessary for bactericidal action. In a series of experiments in which a 1.0 per cent concentration of mandelic acid was added to normal urine and in a series in which the acid was excreted in the urine in a concentration of 1.0 per cent after its administration by mouth, the bactericidal action corresponded very closely.

In the great majority of urinary infections the organisms are of a bacillary type and in large measure are *Escherichia coli*, *aerobacter*, *proteus*, and *pseudomonas*. It was this group which was studied intensively. Ten strains of *Escherichia coli*, 10 of *aerobacter*, 5 of *proteus ammoniac*, and 5 of *pseudomonas* were tested with concentrations of 0.25, 0.5 and 1.0 per cent mandelic acid at a pH varying from 5.0 to 5.7. All of the strains of *Escherichia coli* and of *proteus* were killed at the same concentrations of acid and at the same pH. The 10 strains of *aerobacter* could be separated definitely into a group of 3 strains which were killed under the same conditions of concentration of acid and of pH as the *Escherichia coli* and into a group of 7 strains which were killed only when the pH of the urine was the same as that necessary to kill *Escherichia coli* but the concentration of acid was higher, or when the pH of the urine was lower and the concentration of mandelic acid remained the same.

The bactericidal effect of mandelic acid has not been studied on a large series of coccus organisms, but several strains of *Staphylococci* have been tested out in individual experiments. In a general way they were found to correspond, in respect to their vulnerability, to the bacillary group. Clinically also 2 patients have been freed from infection with *Streptococcus faecalis* by treatment with mandelic acid.

The authors draw the following conclusions:

1. By oral administration of sodium mandelate, concentrations of the acid varying from 0.25 to 1

per cent can be obtained readily in the urine. In this range of concentration the acid will act bactericidally on most organisms at a pH ranging from 5.0 to 5.7.

2. Certain strains of *aerobacter* and *pseudomonas* are far more difficult to kill than is *Escherichia coli*.

Cook, E. N. and Buchtel, H. A. Mandelic Acid in the Treatment of Infections of the Urinary Tract. *J. Am. Med. Ass.*, 1936, 107, 1799.

The authors have been using mandelic acid or its derivatives in the treatment of infections of the urinary tract for twelve months. The results have varied. In their earlier work this treatment was found efficient in approximately 50 per cent of cases, but later experience has shown that, with more careful management, the results may be improved. One ounce (30 c.c.) of a 10 per cent solution of sodium mandelate was given before meals and at bedtime. On this regimen the patient received 12 gm. of the drug daily. In order to render the urine acid, either ammonium nitrate or ammonium chloride was given in doses of from 4 to 6 gm. daily. To prevent dilution of the urine the patients were instructed to limit their daily intake of fluid to 5 glasses. Of 75 patients given this treatment, the urine of 61 (81 per cent) was rendered sterile.

Recently the ammonium salt of mandelic acid has been prepared in a 40 per cent syrup solution. This has proved very efficacious. Of 12 cases in which it was used the urine was sterilized in 11. In 1 case ammonium nitrate was necessary to bring about the desired acidity of the urine.

Offhand it may seem that this form of therapy is extremely simple, that all the physician has to do is to write a prescription for mandelic acid and an acidifying drug and cure is assured. However, this is not the case, for unless the physician is alert in his management of the case and checks the pH of the urine daily he will be greatly disappointed in the results.

The urological indications for the use of mandelic acid are the same as those for use of the ketogenic diet. To date, bacillary infections are readily attacked by this form of therapy while coccic infections are not.

Most of the authors' patients have taken mandelic acid or its derivatives without untoward effects. Fewer than 1 per cent have experienced nausea or vomiting. While diarrhea occurred in approximately 1 in 10 cases, it was usually of a mild character. In a few cases, however, from 8 to 14 stools were passed a day and administration of the drug had to be stopped for a while. In such cases the treatment was resumed later with decreased dosage and there were no further ill effects.

# SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS

## CONDITIONS OF THE BONES, JOINTS MUSCLES TENDONS ETC

Gill A B and Stein I Bone Metabolism Its Principles and Its Relations to Orthopedic Surgery *J Bone & Joint Surg* 1930 18 941

Bone may be affected by such local conditions as disuse injury, and infection, and by general conditions such as toxemia anemia and malnutrition. The humoral changes are chiefly variations from the normal of the serum calcium and phosphorus which are essential for calcification and are present normally in the blood serum in the ratio of 10:1. Their normal concentration in the plasma depends upon their adequate intake in the diet proper hydrogen ion concentration of the intestinal contents the presence of magnesium in the blood and an adequate supply of Vitamin D. The dietary ratio for optimal absorption is 3 parts of calcium to 5 parts of phosphorus. Acidity of the intestinal contents aids absorption and does Vitamin D. The latter also controls the level of concentration of calcium and phosphorus in the blood along with parathormone (the secretion of the parathyroid gland) each of which tends to inhibit the action of the other. Unopposed Vitamin D raises the serum phosphorus and lowers the serum calcium while unopposed parathormone produces the opposite effect. The solubility of calcium phosphate is influenced by (1) the hydrogen ion concentration and carbon-dioxide tension of the plasma (2) proteins and magnesium salts and (3) phosphatase an enzyme found in bone kidney intestines and other organs which liberates free phosphate ions from hexose phosphates.

Generalized osteitis fibrosa cystica is characterized by high serum calcium and phosphatase and low serum phosphorus. Bone and joint pains decreased neuromuscular response asthenia anemia, gastrointestinal disturbances polydipsia and polyuria are characteristic symptoms. Generalized osteoporosis with or without osteonerosis is the basic pathological finding. Multiple bone cysts and tumors and metastatic calcification of the kidneys and other organs are late but not infrequent changes. These may be due to excess parathormone secretion as they can be reproduced in experimental animals by the injection of excess parathormone over a long period. Therefore parathyroidectomy should arrest and bring about recovery from the disease. Parathyroid adenomas have been removed in over 100 cases with arrest of the process. Excess amounts of calcium phosphorus and Vitamin D in the diet will also counteract the abnormal metabolism.

Hypoparathyroidism produces a phosphate diuresis. Consequently bone is decalcified. Fibrosis and cyst formation will follow if the condition is prolonged. Parathyroid adenomas are the usual cause, and their excision is the treatment of choice.

In hypoparathyroidism phosphates are retained and the output of urine is decreased. The excess phosphate is excreted into the colon where calcium is precipitated. As a result, the serum calcium is decreased and occasionally tetany (parathyrodo-privea) develops. The production of diuresis by sodium chloride or the addition of magnesium or strontium will raise the serum calcium.

Renal rickets is said to develop on the primary basis of kidney damage. Retention of phosphates occurs and as in hypoparathyroidism the serum calcium is reduced. It is believed that the parathyroid then becomes hyperplastic in response to the calcium deficiency. Generalized decalcification is frequent. Dietary treatment with excess calcium and phosphorus and an adequate supply of Vitamin D will counteract the hypoparathyroidism and assist in recalcification of the bones. Some authorities advise excision of the hyperplastic thyroids.

Rickets and osteomalacia are caused by a reduction of lime salts with a relatively low phosphorus high calcium and low Vitamin D intake. The treatment consists in giving Vitamin D calcium and phosphorus in the proper ratio in the diet.

Osteitis deformans (Paget's disease) presents typical deforming bone changes which are demonstrable by the roentgenogram and is characterized clinically by bone pain joint stiffness local heat and tender nodes and myotonia. The blood shows a high phosphatase content. There is sometimes a moderate retention of calcium and phosphorus and often of magnesium and sulphur. There is no evidence to connect this disease with parathyroid dysfunction. A diet low in phosphorus and calcium and high in magnesium has been found to decrease the blood phosphatase lessen the calcium and phosphorus retention relieve the symptoms, and cause a reversion of the bone picture demonstrable in the roentgenogram. Care must be taken to prevent magnesium intoxication.

Osteogenesis imperfecta is apparently a congenital defect not associated with parathyroid dysfunction or abnormal calcium and phosphorus metabolism.

The authors report a case of cystic bone disease in which the results of parathyroidectomy performed twice were only fair until a diet with a high content of Vitamin D calcium, and phosphorus was given. When this diet was not adhered to relapses occurred. The case history is supplemented with numerous roentgenograms.

ROBERT S. REICH M.D.

Wommsen F. Investigations Regarding the Statics in Paralysis of the Abdominal and Spinal Musculature (Untersuchungen ueber die Statik bei Bauch und Rueckenmuskelaehmungen) *Ztsch f Orthop* 1936 63 155

According to theoretical investigations regarding the static functional importance of the physiological

curvatures of the spine which, from the standpoint of embryology, are to be regarded as the end result of the struggle between the upright position and the organs of locomotion on the one hand and the respiratory apparatus and visceral functions on the other, it has been established that, in the female, the third lumbar vertebra, the chief rotation point of the abdominal centers, lies somewhat more posteriorly than in the male. This observation is in agreement with the further changing of the shape of the pelvis of the female by the development of her reproductive organs and the burdens imposed by pregnancy which, after multiple births, may frequently lead to the phenomenon of overhurdening of the spine, namely, lumbargia.

The tension which holds the spine erect is due not only to the extensor muscles of the back, but also to the elasticity of the thoracic cage and the pull of the urinary bladder. There is no completely normal type of posture. First one, and then another, component plays a role in determining the shape of the spine in the various types of body structures and their differences in posture. The hip, abdominal, thoracic, and cervical centers are interdependent and maintain themselves according to the inclination of the pelvis and the sacral surface. To demonstrate this, the author fastened an angularly bent wire indicator to the posterior surface of the sacrum with adhesive plaster. In the free systematic attitude the inclination of the sacral indicator to the horizontal was 43 degrees and could be decreased to 18 degrees by voluntary pelvic inclination. The adoption of the 'extended' military position, which is obtained by tension of the transverse and oblique abdominal muscles and forward inclination of the body at the ankle joints, increased the angle of inclination of the sacral indicator up to 46 degrees. As the pubospinal planes vary within these limits in normal persons, they cannot be regarded as a faultless standard of measure for malposture in the abnormal. Indicative of the latter are only the grosser deviations which can be determined with the "3 plane" measuring instrument of Biesalski.

The author therefore distinguishes "rigid" and "relaxed" body types and many intermediate habitual body postures. By photographs of children with paralysis of the trunk muscles, whose spinous processes were indicated by markers, he shows that the usual posture assumed by paralytics closely resembles the relaxed posture of normal individuals. However, the distention of the abdomen in paralysis of the abdominal muscles seems to depend not only upon the paralysis, but also upon defective function of the intestines. Moreover, the hyperextension of the hip joint and the transition of the spinal column to the final position supported by ligaments, with an increased lumbar bend at the transition of the sacrum to the lumbar spine, are evident. Just as, according to the law of functional adaptation, the biological stability of form of the foot plays a rôle in the development of flat foot, so too the changing of the form of the spine depends in the final analysis

on its biological stability of form. Therefore in cases of simultaneous paralysis of the trunk and hip muscles a corrective torso support with a pelvic band is of value since, by the anterior abdominal lacing and the posterior elastic tension of such a support the lumbar lordosis is decreased.

From a comparison of 5 cases of paralysis, which he reports, with the observations of Duchenne, Mommensen concludes that Duchenne's assumption that lumbar lordosis is always directly proportional to the weakness of the extensor muscles of the lower part of the back is incorrect. Of much more importance in the development of spinal curvature is the condition of the hip muscles, the breaking down of the vertebrae, and the "stability of form" of the spine. (DUNCCKER) JEROME G. FINDER, M.D.

Stewart, D. An Experimental Study of the Return of Function After Tendon Section. *Brit J Surg* 1936, 24, 388.

The gait of cats before and after resection of  $\frac{1}{2}$  in of the Achilles tendon in both hind legs was recorded by the author by taking motion pictures. It was found that, a week after the operation, the affected feet were completely plantigrade and the entire hind quarters stiff and inefficient. Three weeks after the operation the legs were more efficient, but the feet were still plantigrade. After six weeks the gait was normal.

The animals were then sacrificed and the tendons examined histologically. Grossly, the cut tendons had united and moved freely in a sheath. Microscopically, the tissue which had filled in the resected portion resembled normal tendon very closely. However, the direction of the fibers was not quite parallel, there was a navy appearance in the longitudinal section, the cells were much less compressed from side to side than those in normal tendon, and the separation into hundles was not so marked in normal tendon.

While some observers have said that the repair tissue is connective tissue scar and not true tendon, the findings of these experiments indicated that regeneration of true tendon tissue had occurred. In a guinea pig the repair tissue examined four months after the operation could not be distinguished from normal tendon. WILLIAM ARTHUR CLARK, M.D.

Thomsen, W. Tennis Arm—Epicondylitis humeri (Veber den Tennisarm—Epicondylitis humeri) *Aftenen med H chnekr*, 1935, 2, 1803.

The syndrome of epicondylitis humeri is not uniform. Like that of hallux rigidus or valgus, it includes a series of stages. The epicondylitis begins with involvement of the extensor muscles of the forearm. Detailed examinations have shown that, foremost among these, the extensor digitorum communis is affected. By Hohmann's operation it has been demonstrated repeatedly that this muscle in particular is involved. Special involvement of the long extensors of the fingers seems to be proved by the fact that passive flexion of the wrist with the

fingers extended causes no pain whereas closure of the fist whereby the extensor digitorum communis becomes markedly stretched is painful. Because of the especially thick fascia which surrounds this muscle as compared with the other extensor muscles of the forearm there is also a disturbance of the circulation in this muscle.

Before treatment a detailed examination of the long extensors of the fingers should be made and a roentgenogram taken. If only the musculature is involved and neither pressure pain nor localized pain at the epicondyle occurs on extension immediate operation is contra indicated. The hand and forearm should be immobilized on a Cramer splint without fixation of the elbow. The splint must pass beyond the fingers to bring them into hyperextension. In cases in which the presence of severe inflammatory processes is assumed dressings moistened with water and alcohol or antiphlogistine compresses should be applied. In such cases massage is contra indicated. In other cases hot air and massage may be employed at the onset and in the chronic course of the condition. If all conservative measures fail the Hohmann operation should be performed.

Histological examination of small pieces of the tendinous insertions of the long extensors of the fingers which were removed at operation showed the picture of an inflammatory irritation of the musculature. Inflammation leads to a shrinkage which progressively interferes with muscle relaxation.

Precautions should be taken to prevent the condition. At the beginning of instruction in tennis training and practical exercises in massage should be given. There should be no hyperextension of the extensor group of muscles. A spastically tight hold on the racket should be avoided and the grip should be frequently relaxed at rest intervals. A relationship of epicondylitis humeri to an accident is to be recognized only when considerable force was exerted and not after minor injuries. The tennis elbow of tennis players may be considered an occupational disease.

(W. POHLE) JEROME G. FINDER, M.D.

Hampton, A. O. and Robinson, J. M. The Roentgenographic Demonstration of Rupture of the Intervertebral Disk into the Spinal Canal After the Injection of Lipiodol. *Am J Roentgenol*, 1936 36 782.

After discussing important improvements in the technique of lipiodol injection into the subarachnoid space and in the interpretation of the roentgen findings as an aid in differential diagnosis the authors report the roentgen findings following lipiodol injection of the subarachnoid space in 50 cases in which operation was done for the relief of symptoms of spinal cord or nerve root compression caused by the protrusion of a portion of an intervertebral disc into the spinal canal. In the majority of the cases the lesions were unilateral ruptures of the lower lumbar discs producing no significant block and associated

with clinical findings almost indistinguishable from those of low back strain, sacro-iliac disease, sciatica or a related condition. The majority of the patients were males ranging from twenty to forty five years of age. Conservative methods of therapy were used before the lipiodol injections and operations. Of 30 lesions in the lumbar area 36 were ruptures of the fourth and fifth lumbar discs. Rupture of the fourth lumbar disc was twice as frequent as rupture of the fifth. In all but 1 of the 31 cases treated during the past three years it was possible to demonstrate the presence of a lesion. The diagnosis of ruptured intervertebral disc was made accurately in 23 cases.

A rupture of the fifth lumbar disc will not compress the fifth lumbar root because this root leaves the vertebral canal above the fifth lumbar disc but it will compress the first sacral root as the latter crosses the fifth lumbar disc. The authors demonstrate these facts by roentgenograms and by drawings of operative findings.

The findings in the usual roentgenograms, the technique of lipiodol examination, the correlation of the surgical and roentgen findings, a study of the anatomical relations of the nerve roots and an explanation for variations in the normal picture after the injection of lipiodol in this area are presented, and a method of interpretation based on identification of the individual nerve roots is described. The authors conclude that roentgen examination of the subarachnoid space following its injection with lipiodol is of definite importance in the differential diagnosis of all symptoms producing ruptures of the intervertebral discs into the spinal canal and of paramount importance in the differential diagnosis of unilateral lumbar ruptures accompanied by low back pain with sciatic radiation.

A correlation of the clinical, laboratory, and roentgen findings after the injection of lipiodol should permit an accurate pre-operative diagnosis of posterior rupture of the intervertebral disc in nearly every case.

ROBERT P. MONTGOMERY, M.D.

Blumensaat, C. The Inflammatory Diseases of the Patella (Die entzündlichen Erkrankungen der Knieescheibe). *Ergebn d. Chir.* 1936 29 310.

In presenting a detailed review of the literature the author states that little is known about inflammatory diseases of the patella and that particularly in textbooks and manuals these conditions are barely mentioned.

Primary hematogenous osteomyelitis of the patella is rare. In the world literature only 22 cases have been reported. To these the author adds another case that of a boy five years of age. The very acute, highly febrile onset is characteristic. The condition is very apt to be confused with acute prepatellar bursitis. However in the latter condition the knee is held fixed in extension whereas in a primary suppurative inflammation of the knee a flexion contraction usually occurs. In the majority of the cases reported it was assumed that the condition was of traumatic origin but the data recorded did not

bear out this assumption. Against a traumatic origin is the fact that, while the patella is very often subject to injury, osteomyelitis of the patella is very rare. This is explained by the very poor blood supply of the patella.

The conservative treatment formerly employed in cases of osteomyelitis of the patella was incorrect. Operation should be done as soon as possible in order to prevent rupture of the process into the knee joint. If the diagnosis is made and treatment is given early, the prognosis as regards function is good.

Secondary osteomyelitis of the patella due to articular empyema is common. The author cites the only case so far to be recorded of secondary osteomyelitis of the patella originating from a prepatellar bursa.

Primary tuberculosis of the patella is considerably more common than osteomyelitis. Its characteristic features are an insidious onset, a circumscribed point of tenderness, and a doughy swelling of the prepatellar region or the entire region of the knee joint with only very slight rises in the temperature. Usually the condition goes on to fistula formation and involvement of the knee joint. The roentgenogram shows an atrophic, indistinct bony structure with a structureless indistinctly outlined focus. In the course of the disease small sequestra are nearly always formed. The roentgen changes are evident at the earliest after from two to three weeks. Of importance in the differential diagnosis is the fact that a tuberculous prepatellar bursitis often develops secondarily. In contrast to osteomyelitis and syphilis a reactive periostitis is absent. Trauma is rarely of importance in the development of the condition. The treatment of tuberculosis of the patella should be surgical. It should consist of removal of either the focus or the entire patella. When rupture into the joint has not occurred, the prognosis is good. When the patella and the joint are involved by tuberculosis simultaneously, it is usually difficult to determine whether the focus in the patella was primary or secondary.

Isolated syphilis of the patella is very rare. Only 1 case has been reported. The characteristic features of the condition are severe spontaneous and pressure pain which is especially severe at night. The patella usually shows a tumor like swelling. A sympathetic joint exudation is common. The roentgenogram shows an osteitis and periosteitis without bone atrophy. Freedom of the posterior surface of the patella from involvement explains why the patella usually remains normally mobile. Apparently, syphilis of the patella develops usually without trauma even though in some cases the patient's statements may give rise to the contrary assumption. In every case the treatment indicated is conservative specific. Such treatment always results in relief of the subjective symptoms but not always in disappearance of the objective symptoms.

In conclusion the author discusses involvement of the patella in gonorrheal and tuberculous disease, the

occasionally reported neuralgic patellar osteitis, and mycosis and sporotrichosis of the patella.

LOUIS NEUWELT, M.D.

## SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC

Albee, F. H. The Treatment of Primary Malignant Changes of the Bone by Radical Resection with Bone Graft Replacement. *J Am Med Ass*, 1936, 107: 1693.

The author reviews 13 cases of bone tumor in long bones. In 3 of these the neoplasm involved the shoulder region, in 7, the lower end of the femur, and in 3, the shaft and lower end of the tibia. The treatment Albee advocates is radical resection of the tumor followed by what he calls a "plastic bone graft replacement operation." He states that while in 1 or 2 of his cases the growth may have been a benign giant cell tumor, it was so markedly advanced and the surrounding soft tissue was so involved at the time of operation that radical resection was indicated. Most of the patients were followed up for a period of about two and one half years and remained free from recurrence.

PAUL C. COLOVNA, M.D.

Bastos Ansart, M. Successful and Unsuccessful Transplantations of Tendons (Transplantaciones tendinosas eficaces e ineficaces). *Ciruj orlop i traumatol*, 1936: 1-5.

The author presents a comprehensive critical discussion of the physiological factors in tendon transplantations. He states that the chief cause of disagreement regarding the efficiency of these operations is the error of considering the technical problem to the neglect of the biological problem. The results of transplantation are often either better or worse than would be expected *a priori*. No standard plan, general indications, or schematic technique can be laid down. The fundamental questions are in what conditions and within what limits can a muscle change its function, and what are the obstacles to this change?

Ansart emphasizes the following principles:

The main function of a muscle cannot be radically changed but its accessory functions can be altered by transplantation. The utilization of the latter is always efficient and may be sufficient to restore equilibrium. Some muscles are in the balance with respect to certain movements, and their transplantation produces a notable increase of force.

As the presence of intact antagonists often interferes with the functioning of transplants, complete paralysis of a muscle zone is preferable to a partial defect. This is in accordance with Bell's theory of mutually inhibitory spinal centers of flexion and extension.

In this connection Ansart makes a preliminary report on experiments he carried out on dogs to determine the functional and histological results when muscles are changed radically in direction and

insertion. He implanted the flexors of the thigh on the patella after cutting the quadriceps tendon. When only the biceps was transplanted, the animal was unable to dissociate the impulses to it from the internal still flexor group. When the entire group was transplanted, the leg was held in tonic extension but could not be coordinated with the remaining muscular synergies in walking.

These experiments confirm clinical observations that transplantation of an entire group to replace completely paralyzed antagonists suppresses the rhythm of contraction in the transplants putting them under continuous tension while the efficiency of partial transplantation is disturbed by the conserved synergies. In terms of Bell's hypothesis the flexor hemicenter tried unsuccessfully to dissociate again into a subordinate centers to carry out the alternating rhythm of contractions in locomotion. Bell's hypothesis appears to apply also to human locomotion and renders dubious some ambitious transplantations in the lower extremity. This obstacle does not exist in the upper extremity where the movements are not held to such a rigid pattern.

In poliomyelitis the impossibility of determining the exact delimitations of the paralysis, the condition of the transplants and the presence of a smoldering spinal cord lesion make the results of transplantations unpredictable. It is not always possible to determine whether a muscle is actually paralyzed or is terrorized by a powerful antagonist. In the latter case transplantation effects more than mere re-adaptation of remaining force; it awakens latent power.

Contracture is the worst enemy of transplantation and its chief contra-indication. If it exists it must be treated before transplantation is considered. When transplantations in contracted limbs occasionally appear successful, their efficacy is due only to the section of the tendons.

Muscles suitable for transplants are those with parallel fibers, a fusiform belly and a broad tendon. These features connote a wide amplitude of contraction. Muscles having penniform fibers, a long belly, and a long free tendon are unsuitable.

The author warns against making transplanted tendons too tense. He advocates the braiding method of fixation in which the head of the transplanted tendon is earned to the insertion of the receptor tendon. In certain transplantations the proprioceptive stimuli experienced by the paralyzed

muscle through the agency of the healthy tendon are important factors contributing to rehabilitation.

The article is illustrated with photographs.  
M. E. MOXER, M.D.

Smith, Petersen, M. N. The Treatment of Malum Coxae Senilis. Old Slipped Upper Femoral Epiphysis Intrapelvic Protrusion of the Acetabulum and Coxa Plana by Means of Acetabuloplasty. *J. Bone & Joint Surg.*, 1936, 18, 849.

When first seen by the author, a case diagnosed as bilateral intrapelvic protrusion of the acetabulum was believed to be untreatable. However, on the assumption that the pain and disability were due to a 'traumatic arthritis' caused by impingement of the neck of the femur on the anterior margin of the acetabulum, an operation was devised to relieve the impingement. This procedure which consisted essentially of osteotomy on the anterior acetabular margin and partial capsulectomy of the anterior portion of the capsule of the hip joint is described in detail with illustrations. The approach was through the anterior aspect of the thigh and exposure obtained by dividing the tendon of the direct head of the rectus femoris muscle. Gentle manipulation of the femur at the end of the operative procedure is advisable to increase the range of motion. The postoperative period of hospitalization was from three to four weeks, the first two weeks of which were spent in recumbency with the leg in maximum abduction and internal rotation and maximum flexion with 5 lb of traction. The patient was then allowed up and walked at first with the aid of crutches.

The early result in the first case was so gratifying that the operation was recommended for any case in which pain and disability were due to a traumatic arthritis set up by friction between the neck of the femur and the anterior margin of the acetabulum. The author believes that such friction occurs also in malum coxae senilis, old slipped upper femoral epiphysis and coxa plana. In all of 11 additional cases treated by the described method the operation resulted in relief from pain and a definite though not marked increase in the range of motion. While the length of time that has elapsed is not sufficient for determination of the end results, the author feels justified in rendering a preliminary report because the method is constructive and relieves pain for which there had been no adequate treatment heretofore.

RODOLPH S. REICH, M.D.

# SURGERY OF THE BLOOD AND LYMPH SYSTEMS

## BLOOD VESSELS

Spiegel, R. The Clinical Aspects of Periarthritis Nodosa. *Arch Int Med*, 1936, 58, 993

The essential lesion of periarthritis nodosa is a primary injury to the wall of the vessel with swelling, necrosis, and fibrillation of the media, destruction of the elastica interna, and infiltration of the adventitia with polymorphonuclear leucocytes which are often eosinophilic, and also with many histocytes. The author reports 17 cases. In 10 there was a prodromal infectious disease. Abdominal pain, for which operation was performed in several cases, was present in 9. The cardiac lesions and the lesions occurring in the lungs, kidneys, digestive organs, adrenal glands, central nervous system, skin, eyes, and serous membranes are tabulated, and the laboratory findings are reported. The author then discusses the etiological relationships of the condition to other diseases and certain bacterial organisms. He states that the disease may follow diseases due to definite organisms, such as gonorrhea, meningococcal meningitis, and hemolytic streptococcal infections.

PAUL STARR, M D

Boyd, L J and Nussbaum, C. Some Clinical Aspects of Periarthritis Nodosa. *Med Clin North Am* 1936, 20, 973

The tendency to regard periarthritis nodosa as a rare pathological lesion is rapidly decreasing. More frequent consideration of the condition in differential diagnosis has led to widespread recognition of its practical importance and a rapidly increasing number of correct ante mortem diagnoses.

According to the authors periarthritis nodosa is probably not a disease *sui generis* but a hyperergic defensive reaction of the small muscular arteries and arterioles to a variety of toxic and infectious factors. It has been observed in infants and children, but more than one third of the cases are those of persons in the third decade of life. Sixty seven per cent of the subjects are males. The preceding disease is not diagnostic. The attempt to distinguish clinical types is deceptive. Any symptom may be present and none is constant. Some well known infectious disease is suspected. Fever is present in only two thirds of the cases, and is often intermittent. Loss of weight and strength and a cachectic appearance are fairly constant and often marked. Recurrent punctate hemorrhages in the skin, at times generalized and associated with joint pain and swelling, are not unusual. Subcutaneous nodules may appear, and a careful search for them should be made. Polymyositis occurs in more than half of the cases. Polyneuritis is frequent and very suggestive from the diagnostic standpoint. Pulmonary and cardiac symptoms may be present and marked but are not frequent. Renal involvement

is common, and may vary from sudden massive hemorrhage to repeated smaller hemorrhages and the gradual onset of renal insufficiency.

Since periarthritis nodosa affects the gastric, mesenteric, and intestinal vessels in most cases, abdominal symptoms are generally present. Pain usually occurs in the upper part of the abdomen and may persist for weeks or months. The condition is accompanied by anemia and a leukocytosis. In about 10 per cent of the cases an eosinophilia, which may be very high, is present. Blood cultures are usually negative. As, with few exceptions, only the fatal cases have been well studied and reports of cases of spontaneous recovery have multiplied since clinicians have become interested in the condition, it is highly probable that our theories regarding the mortality are wrong and that unrecognized cases with spontaneous recovery may be common. Most diagnostic mistakes have been due to failure to consider the condition as a possibility.

PAUL STARR, M D

Braeucker, W. The Results of Treatment of Vascular Diseases of the Extremities (Die Heilerfolge bei den Gefasskrankungen an den Extremitäten). *Verhandl d deutsch Gesellsch f Kreislaufforsch*, 1936, p 319

The author describes methods of treatment which, in the last ten years, he developed or at least developed more fully and tried out in severe cases of Raynaud's disease, arteritis obliterans, and arterio-sclerosis, including diabetic gangrene, in which usual methods such as massage and the use of hot air, alternating baths, and electricity had failed. First he describes the 3 types of disease, citing typical cases, and then explains the effect of the treatment physiologically and reports its results.

In Raynaud's disease, in which, he assumes, there is an abnormal state of irritability in the centers and conduction paths of the vasomotor nervous system which is sometimes localized predominantly in the centers of the spinal cord and the sympathetic nerve, sometimes more in the centers of the blood vessels of the extremities, and sometimes in all of these centers equally, he uses as exercise therapy the suction treatment. The purpose of this is to relieve the spasms and the disturbances of innervation in the affected portions of the circulation and nervous system by artificially induced passive hyperemia. Occasionally he supplements it with paravertebral injections of novocain in the vicinity of the corresponding areas and ganglia of the sympathetic nerve, a course of treatment with artificial fever, periarthral sympathectomies, or extirpation of the corresponding portions of the subordinated sympathetic nerve. In this way he has obtained complete cures of Raynaud's disease even in its most severe forms.



Whereas in Raynaud's disease an abnormal irritability of the nervous system radiates into the vascular system in arteritis obliterans just the reverse is true. In the latter condition the function of the obstructed artery is replaced by the collateral circulation so long as this remains undisturbed. The irritated nerve plexus in the shrunken main branch (the obliterated induratively changed artery is practically an irritated nerve) causes pathological reflexes. As is demonstrated by several illustrative cases in which gangrene had already set in treatment similar to that employed by the author for Raynaud's disease (suction etc.) may restore the patient's ability to walk and to work. A very severe case of general spread of the disease in the legs, trunk, and arms was cured in four and a half years, even the ability to work being restored by operative removal of the left adrenal gland and a portion of the celiac plexus.

The author rejects the old sympathetic and parasympathetic theory of Langley. He regards the sympathetic nervous system as a giant network which spreads everywhere and maintains itself in tension balance through numerous centers connected with each other (sympathetic nerve, spinal cord, spinal ganglia, and perivascular nervous networks). Each center has its own region but exerts an influence over all of the others even when the tracts do not pass through the spinal cord. This explains the effect of surgical interruption and excisions of vascular nerve plexuses and the sympathetic nerve. Ganglia that are injured by too great demands made upon them undergo degeneration and injure the collateral circulation. Their extirpation cures by eliminating the secondary vasomotor disturbances.

Nine cases of severe Raynaud's disease were completely and permanently cured. Of 270 patients with arteritis obliterans who were treated in the last ten years, 138 were rendered able to walk and to work after from five to six weeks by suction treatment alone. Those with a mild form or a recurrence of the condition were treated and relieved in the same way. With regard to the 132 patients treated surgically, the author presents detailed statistics. These show that lumbosacral resection yielded better results than lumbar resection. They demonstrate also that still demonstrable dilatability of the peripheral vessels in the diseased extremity is of great importance in the prognosis of the disease and the results of operation.

The author divides his results into 3 groups: (1) good—complete ability to walk and to work, 47 per cent of the cases; (2) medium—certain difficulties and limitation of the ability to work, 11 per cent of the cases; and (3) unsatisfactory—recurrences and the necessity for amputation, 42 per cent of the cases. He shows that of 41 cases in which amputation would have been considered necessary formerly, he was able to restore complete ability to work in 17 (41 per cent). In this article he does not report on his results in cases of arteriosclerosis.

(FOGERT) LOUIS NEWELL M.D.

## LYMPH GLANDS AND LYMPHATIC VESSELS

Wiseman B. K. The Blood Pictures in the Primary Diseases of the Lymphatic System. Their Character and Significance. *J Am M Ass* 1936 107 1016

Wiseman separates diseases of the lymph nodes into those with only a local reaction and those with a general lymphatic reaction. The latter are considered primary diseases of the lymphatic system. They include lymphatic leukemia, lymphosarcoma and Hodgkin's disease.

Cases of lymphatic leukemia vary from the extremely acute to the very chronic. At times there may be typical pathological changes in the lymph glands without any alteration in the peripheral blood cells. The author cites a case of extremely benign lymphatic leukemia in which there was no evidence of an increase in activity of the disease over a period of five years. He believes it possible that lymphocytosis or leukemia may often occur in such a benign form. Irradiation therapy is helpful in treating the symptoms and signs but does not greatly prolong life.

In lymphosarcoma there is a neoplastic transformation of the lymphocytic strain of cells. There may be no changes in the peripheral blood except an occasional secondary anemia or low grade lymphocytosis. On the other hand neoplastic cells may break over into the peripheral blood and in some cases a leukemic type of blood picture may occur. The tumor lymphocytes are considerably more radiosensitive than the normal lymphocytes. A single dose of x ray irradiation may result in temporary disappearance of the tumor cells from the peripheral blood but x ray therapy is considered to be of little value in the treatment of the condition.

In Hodgkin's disease there is no constant abnormality of the blood picture but certain trends are observed. The leucocyte count is usually normal. The most constant finding is a lymphopenia with a monocytosis producing a high monocytic leucocyte index. There is a distinct tendency toward a neutrophilia often with an absolute increase in the eosinophils. Secondary anemia is almost a constant feature. These characteristics are interpreted as suggesting an alteration of the reticulum cell monocyte maturation cycle caused by an infectious agent. The blood picture should be carefully observed during x ray therapy. Since satisfactory erythrocyte, lymphocyte and neutrophil leucocyte counts are important for health a serious depression of these elements is a contraindication to continued irradiation therapy.

HOWARD L. ALT M.D.

O'Brien F. W. The Roentgen Treatment of the So Called Malignant Lymphomas. *J Am M Ass* 1936 107 2022

O'Brien reports the results of roentgen therapy in a series of cases of Hodgkin's disease, lymphatic leukemia and myelogenous leukemia.

The 34 patients with Hodgkin's disease who died had had the disease for an average period of fourteen and eight tenths months before the roentgen therapy and lived an average of fourteen and four tenths months after it. The average length of their survival was therefore about two and five tenths years. The 11 patients still living had had the disease for an average of eleven and two tenths months before the roentgen therapy and for an average of twenty one and seven tenths months after it, the average length of their survival being therefore more than two years and nine months. Life did not seem to be prolonged appreciably by the irradiation. At first, low- and medium voltage roentgen therapy was used, but in the past three years the factors in the technique have been 200 kv., 8 ma., filtration with 0.5 mm. of copper and 1 mm. of aluminum, a distance of 50 cm., about 210 roentgens measured in an air field, and irradiation of 1 or 2 fields daily or every other day, depending on the general condition of the patient. With this method of giving fractional doses of roentgen therapy locally there is very little danger of causing damage to the erythropoietic system. There were no cases of Hodgkin's disease in which

the occurrence of anemia could be attributed to irradiation.

Twelve patients with lymphatic leukemia had had the disease for an average of thirteen and nine tenths months before the roentgen therapy and lived for an average of fourteen and six tenths months following the irradiation, their survival averaging about two years and four months. Two of these patients are still living.

Twenty-nine patients with myelogenous leukemia had had the disease for an average of sixteen and five tenths months before treatment and for an average of twenty one and nine tenths months after the irradiation, their survival averaging three and two tenths years. Four of these patients are still alive. Some of the patients enjoyed relatively good health over long periods of time, but there is no convincing evidence that irradiation prolongs life. The patients who lived longest seemed destined to do so because of the natural history of their disease.

A method of irradiation, teleroentgen therapy, is discussed by the author. This is in the experimental stage, but may lead to greater salvage in the conditions described.

HOWARD L. ALT, M.D.

# SURGICAL TECHNIQUE

## OPERATIVE SURGERY AND TECHNIQUE, POSTOPERATIVE TREATMENT

Coller F A, Dick V S, and Maddock W G.  
Maintenance of Normal Water Exchange with  
Intravenous Fluids *J Am Med Ass* 1936 107  
155-2

In many conditions associated with disease the parenteral administration of fluids has proved of great value. However there is some difference of opinion as to the choice of fluids.

While the value of saline solutions for patients who have lost sodium chloride has been well established there is a distinct tendency to use these solutions for all parenteral administrations of fluid whether sodium chloride is needed or not. The occurrence of edema in patients receiving such fluids is not uncommon. When the administration of the salt solution is stopped and a solution of 5 per cent dextrose in distilled water is used instead or when fluids are given by mouth the edema promptly disappears. The intravenous administration of the 5 per cent dextrose in distilled water provides for a normal water exchange.

SAMUEL KAHN MD

Rebello Neto J. Surgery of Scars of the Neck and Arms (Cirurgia das cicatrizes do pescoço e dos membros superiores). *Folia med* 1936 17 421

The author discusses the advances that have been made in plastic surgery in the treatment of scars. Technical improvements based on a better knowledge of biology have made it possible to correct even very severe defects and to restore not only normal function but also the esthetic appearance of the part. Examples of the most varied forms of scarring particularly from burns are shown by illustrations and described. The author discusses in particular disfiguring scars of the fingers and hand cicatricial bands which prevent extension of the arm and forearm and scars of the neck. The general method of treatment is extirpation of the scars and skin grafting though of course the details vary greatly in different cases.

Re-examination of the patients years after the operation has shown the value of these methods and has made it possible to determine the indications in different types of cases. Preparation of the field of operation is a very important factor in the success of the operation. In cases of severe scarring early surgical treatment is the only means by which serious trophic disturbances of the bones can be prevented.

AUDREY GOSS MORGAN MD

Duval P and Binet L. Postoperative Pulmonary Lesions (Les lésions pulmonaires post opératoires). *Presse méd* Par 1936 No 92 1800

The pathogenesis of certain postoperative pulmonary lesions is well established. Inhalation anes-

thesia an embolus of phlebotic origin or an infection originating in an infected operative field and disseminated by the blood or lymphatic circulation having been found responsible for their occurrence. The authors report investigations which they carried out to determine the cause of postoperative pulmonary complications in cases in which operation is done with strict asepsis in an uninfected field and under anesthesia other than inhalation anesthesia.

The theory on which their experiments were based was that every operation produces some toxemia because of breaking down of the proteins of the tissues by the operative traumatism and dissemination of these products by the venous route. The toxic substances are chiefly polypeptides. The resulting toxemia differs from that due to heterogeneous proteins which accompanies shock and may cause visceral including pulmonary lesions.

In attempts to reproduce this condition in animals dogs were used and the polypeptides injected were obtained from the muscles of dogs. The polypeptides were injected into both the saphenous and the mesenteric veins because in some operations only the peripheral veins are involved while in intra-abdominal operations the portal circulation is also affected. Some of the experimental animals were sensitized by a preliminary subcutaneous injection of the polypeptides in a dose of 10 cgm per kilo gram of body weight. Others were not so sensitized. All of the sensitized animals developed pulmonary lesions whereas the non sensitized animals showed no visceral lesions. Controls anesthetized and killed in the same way showed no pulmonary lesions.

The pulmonary lesions appeared as deep violet red areas which were clearly distinguished from the normal lung tissue. They varied in extent and distribution. Histological examination showed them to be of 2 types (1) 'pulmonary apoplexy' or infarction without obliteration of the blood vessels and (2) typical pulmonary atelectasis or collapse of the lung. They resembled the lesions in clinical cases of postoperative lung complications in which death occurred soon after operation.

A clinical case coming under the authors observation recently has further confirmed these findings. An exploratory laparotomy under local anesthesia was followed by pulmonary complications terminating fatally after four days. The pulmonary lesions were the same as those observed in the experimental animals injected with polypeptides after sensitization. Blood analysis two days before death showed that polypeptides were present in almost 3 times the normal amount 80 mgm. The blood urea was 2 gm. This observation confirms the experimental findings with regard to the relation of an increase in the polypeptides of the blood to the development of pulmonary lesions after operation.

ALICE M MEYERS

# ANTISEPTIC SURGERY, TREATMENT OF WOUNDS AND INFECTIONS

**Loehr, W.** The Treatment of Hand and Foot Injuries with Cod-Liver Oil or with Cod-Liver Oil and a Plaster-of-Paris Dressing (Die Behandlung von Hand und Fuss Verletzungen mit Lebertran bzw. mit dem Lebertran Gipsverband) *Ztschr. f. aeri. Fortbild.*, 1936, 33, 421

In this article Loehr again stresses the basis and rules of his method. He states that cod liver oil contains vitamins A and B, possesses definite disinfecting properties, since bacteria within it gradually die off, and has an excellent effect upon regeneration. It should be used in the form of a very smooth salve, not as a paste.

In discussing the treatment of fresh injuries, Loehr emphasizes that most of the injuries he treats come from the steel industry, and that injuries of hands soiled with machine oil are to be considered as only mildly infected. He has obtained good results from his treatment in cases of finger tip injuries. He no longer performs plastic operations upon, or sutures, such injuries. He treats simple injuries of the fingers with loss of skin only with cod liver oil salve. When the deeper structures are involved he applies the salve thickly and over it places, first gauze, and then a circular plaster of Paris dressing which he leaves on for from ten to twenty days depending upon the extent of the injury. The second and third plaster bandages can usually be left on longer. Frequently the dressings smell. They must be removed when they begin to crumble. The advantages of the plaster dressing are that it places the injured part at absolute rest, provides a damp dressing in the sense of Bier, and assures by peremia.

The regeneration following this treatment is surprising. The regenerated tissue is characterized by good padding, better nutrition, and a better nerve supply than that following other methods of treatment. Blueness and hypersensitivity of the finger tips are rare. In cases of syndactyly Loehr no longer makes flaps after division, as the generation is excellent. In the treatment of injuries sustained on the farm as compared with those sustained in the steel industry he is more careful. He questions the patient closely with regard to the possibility of infection. Tetanus and gas bacillus serum are given for prophylaxis. Simple dressings of cod liver oil salve are used for a few days until severe infection can be excluded. Only then is the salve and plaster dressing applied. Loehr has never seen a tendinous or osseous panaritium develop under this treatment. He warns against use of the salve and plaster dressing in cases of ordinary panaritium even after incision.

(FRANZ) LEO A. JUNEKE, M.D.

**Wangensteen, O. H.** The Role of Surgery in the Treatment of Actinomycosis. *Ann. Surg.*, 1936, 104, 752.

Actinomyces like organisms are present in the mouths of healthy individuals and are usually not

pathogenic. The sites at which the actinomyces bovis produces lesions most frequently in man are the head and neck, the thorax, and the abdomen.

The lesion produced by the actinomyces bovis is a granulomatous reaction with evidence of acute and chronic infection. There is abscess formation with burrowing pus channels containing collections of pus and sulphur like granules of the actinomyces colonies. Of particular importance is the vascularity of the granulomatous process. Surrounding the necrosis and liquefaction there is an area of proliferation of dense connective tissue which is frequently leiod like. Actinomycosis characteristically extends into healthy tissue, leaving no trace of its presence at the site of entry. This is true particularly of the abdominal type. The condition rarely becomes generalized in the sense of metastasis.

The diagnosis of actinomycosis is made by finding the actinomyces bovis in the discharge or the curetted material. The fungus is anaerobic and gram positive. In cases of cervicofacial actinomycosis in persons of middle age a diagnosis of malignancy is likely to be made. In the cases of younger persons the condition is often believed to be tuberculous of the lymph nodes. Thoracic actinomycosis is likely to be mistaken for empyema, and abdominal actinomycosis for appendicitis.

Wangensteen is of the opinion that iodides have no specific value in the treatment of disease produced by actinomycosis bovis, and that any action they have is due to their effect upon the granulomatous infection. He believes that irradiation is of limited value, and that the treatment of choice is surgical drainage which removes the necrotic material and produces aerobiosis. At first he attempted extirpation of the lesion, but later found that adequate drainage is sufficient. Of his 14 cases of cervicofacial actinomycosis, recovery resulted in 11 and death in 3. In 7 cases of thoracic actinomycosis there were 5 deaths. However 1 death occurred eighteen months after all evidence of the actinomycosis had disappeared. The 2 surviving patients are still under treatment. Of 5 patients treated for abdominal actinomycosis 4 are dead and 1 is still under treatment.

In conclusion the author says that in the cervicofacial type of actinomycosis the prognosis is good if adequate therapy is given, whereas in the thoracic and abdominal types it is poor, irrespective of the treatment.

ALTON ORTNER, M.D.

## ANESTHESIA

**Site L. F.** The Choice of Anesthesia. *Am. J. Surg.*, 1936, 21, 419.

The larger number of anesthetic agents and methods now available make the choice of anesthesia more difficult and more confusing but assure the possibility of a more suitable choice than ever. While there are many factors to be considered in each case, the factor of chief importance is, of course, the safety of the patient.

Of the more commonly used drugs and methods, regional and spinal anesthesia are least toxic and chloroform is most toxic. For abdominal operations spinal anesthesia is to be preferred when technical difficulties are anticipated and field block or intratracheal gas or gas ether with field block when the patient is in poor condition. Ether is a good anesthetic especially when equipment is lacking and a skilled anesthetist is not available. For most operations on the trunk and extremities the gases are satisfactory. The barbiturates given intravenously are excellent. For a few operations which require only very light anesthesia tribromethanol is of value. Spinal anesthesia is indicated especially for operations on the anus, rectum and urinary bladder. For most operations on the head and neck the use of a gas or regional anesthesia is satisfactory. The fields of the surgeon and anesthetist may be kept separate by the use of intratracheal anesthesia, pharyngeal anesthesia or ether insufflation.

JACOB M. MORA, M.D.

Alexander F. A. D. and Cullen S. C. Pre Anesthetic Medication. *Am J Surg* 1936 34 428.

The use of non-volatile sedative and other drugs to prepare the patient for anesthesia and surgical manipulation is common. Pre-anesthetic sedation is a rational procedure based upon well established principles. However no single drug or combination of drugs is suitable for all cases. The most consistently good results are obtained when the various influencing factors are carefully weighed, the available drugs are considered and the effects of the drug chosen and the method of its administration are accurately observed and recorded. The anesthetist who is thoroughly grounded in the physiological and pharmacological principles of sedative drug prescription experienced in the assessment of the varying factors in individual cases and familiar with the conditions under which the anesthesia is to be induced and the operation is to be performed is best fitted to prescribe sedation. Training and experience are more often reflected in the success or failure of pre-anesthetic medication than in any other phase of the anesthetic procedure.

The authors discuss the opiates, paraldehyde, the belladonna group, barbituric acid derivatives, epinephrine and eserine.

JACOB M. MORA, M.D.

Gordier D. Narcosis and Inhalation of Oxygen (Narcose et inhalation d'oxygène). *Anes et anal* 1936 2 529.

The surgeon needs to know whether during and after operations performed under general anesthesia inhalation of oxygen is of value to the patient. During anesthesia anoxemia may result from the following causes:

1. A deficiency in the tension of oxygen in the arterial blood. This may be due to a low oxygen tension in the alveolar air or to alterations in the pulmonary epithelium caused by the anesthetic.

2. A diminution in the number of red blood cells, or changes in these cells which lower their capacity to carry oxygen. These alterations apparently may be brought about by anesthetic agents.

3. Circulatory stasis. This is due in large part to disturbances of the action of the heart caused by direct action of the anesthetic agent.

4. The toxic action of the anesthetic agent on the cells. A great deal of careful study of the changes in oxidation indicates that the internal oxygen metabolism of the cell is markedly modified during anesthesia.

It has been demonstrated that less anesthetic agent is required for an animal with acidosis than for a normal animal or an animal with alkalosis. An increase in oxygen tends to lessen the anesthetic state and reduce lactic acid formation. Moreover, since the respiratory center is normally stimulated by anoxemia, it may profoundly depress respiration. It is possible also that anesthesia itself may depend in part upon a certain degree of anoxemia. For these reasons it seems to the author that the administration of oxygen during anesthesia is usually not desirable.

After completion of the anesthesia, however, the inhalation of oxygen will aid in elimination of the anoxemia and restoration of the normal state.

MAX M. ZIMMER, M.D.

Moffitt J. A. and Mechlign G. S. A Comparison of Cyclopropane with Other Anesthetics. *Anes et anal* 1936 15 223.

In reporting the use of cyclopropane in 300 cases the authors compare the anesthesia induced thereby with ethylene nitrous oxide, ether and spinal anesthesia.

They state that as cyclopropane does not stimulate respiration the pre-anesthetic narcotic was given in smaller doses. Cyclopropane is less disagreeable to the patient than the other anesthetics studied and during cyclopropane anesthesia the respiration more nearly resembles the normal. In most of the reviewed cases satisfactory relaxation was obtained. The pulse rate was slower than in the anesthesia induced with the other anesthetics. The blood pressure showed very little change. There were no postoperative complications which could be attributed directly to the cyclopropane itself.

In conclusion the authors express the opinion that cyclopropane should be used with care both clinically and experimentally for a sufficient period of time to determine definitely whether it is a safe anesthetic.

JOHN H. GARLOCK, M.D.

# PHYSICO-CHEMICAL METHODS IN SURGERY

## ROENTGENOLOGY

Hodges, F. M., and Berger, R. A. Roentgen Therapy of Infections. *J Am Med Ass* 1936, 107 1551

With regard to irradiation treatment, the authors divide infections into 2 groups (1) those in which no other form of treatment is necessary, and (2) those in which irradiation is an important auxiliary to other treatment

Early localized erysipelas responds to treatment with unfiltered rays well beyond the apparent border of the lesion, from 100 to 150 roentgens (in air) being given with a voltage of 85 kv

Furuncles and furunculosis respond favorably, and in the early stages may be aborted in from twelve to twenty four hours. When the lesions are older, irradiation hastens suppuration and drainage. Chronic furunculosis in the axilla and on the neck responds to weekly applications of 125 roentgens at 125 kv of rays filtered with from 4 to 6 mm of aluminum

Infected angiomas and granulomas require doses of from 700 to 900 roentgens of unfiltered rays. The lesions regress in from two to four weeks

Cellulitis of the types following tooth extraction or slight abrasions of the skin yields rapidly to doses of from 100 to 150 roentgens of unfiltered rays

Lymphangitis of certain types, such as that radiating from a localized infected area, responds to irradiation rapidly. Even in the late stages when the lymph channels are cord like and the glands are enlarged, the condition will usually regress under small doses of irradiation

Mikulicz disease yields more or less permanently to treatment with 400 roentgens given with 200 kv and filtration with 1 mm of copper and 1 mm of aluminum

Acute postoperative parotitis responds to either radium or roentgen irradiation. The incidence of suppuration is greatly reduced. In the chronic form good results are obtained almost invariably from a series of treatments with filtered roentgen rays

Infected rhinophyma always responds to 300 roentgens of filtered rays

Early carbuncles are often aborted by a large dose of filtered rays. The best treatment of carbuncles is roentgen therapy combined with heat. The irradiation lessens pain, increases drainage, shortens the course of the disease, and leaves a smaller and more pliable scar

The dermatomycoses respond well to from 500 to 700 roentgens of filtered rays

The authors discuss the changes produced by irradiation, citing some of the present day views

Different types of lesions and similar lesions in different stages of development react to the roentgen rays somewhat differently

In the authors' cases a lesion is rarely given more than 400 roentgens (in air) or two thirds of an ery-

thema dose during a series of treatments. The intervals between treatments are determined by the lesion only. In most forms of infection the greater the leucocytic and lymphocytic infiltration the smaller should be the dose and the softer the roentgen rays, and the more chronic the condition the larger the dose and the harder the rays

HARVEY S. ALLEN, M.D.

## RADIUM

Engelstad, R. B. Teleradium Therapy of Malignant Tumors (Télécurietherapie des tumeurs malignes). *Acta radiol*, 1936 17 421

The author discusses his results with teleradium treatment in the Radium Hospital of Norway, describes and illustrates the "cannon" employed for the administration of this treatment, and presents dosage curves for different distances from the skin. In the beginning, 1,500 gm of radium divided into 30 tubes of 50 mgm each were used. In July, 1932, the amount of radium was increased to 2,000 mgm, and in June, 1936, to 2,600 mgm. The distances of the radium from the skin ranged from 5 to 18 cm

This method was employed for various forms of tumor, but the author thinks it is of most value for cancers of the mouth. In 1932 and 1933 he treated 35 patients with such cancers. Of these, 18 have remained free from symptoms for from two and one-half to four years, 3 had a recurrence but have remained free from symptoms following a second treatment, and 14 are dead

If only 1 field is treated, an irradiation is given every day for from one and one-half to two hours. The dose varies from 3 to 6 D, depending upon the size of the field and the distance. If several fields are treated they are irradiated in turn, 1 being treated each day. The treatment must be varied according to the reactions of the patient. Nausea, vomiting, headache, and other general symptoms are not rare. These are treated by giving the patient a large amount of mineral water to drink and by the administration of ephedrin. The irradiation may cause also more or less edema in the irradiated region. The edema causes anemia of the parts treated and thus decreases the effect of the irradiation. In some locations, as in the larynx or brain the edema may be dangerous

AUDREY GOSS MORGAN, M.D.

Lucas, C. DeF. The Calculation of Dosage in the Radium Treatment of Carcinoma of the Cervix. *Am J Roentgenol*, 1936, 36 477

Lucas computes the effective dose of radium irradiation delivered to the tissues surrounding the cervix when the latter is treated for carcinoma by several of the accepted methods. Although he real-

izes that treatments are, and must be individualized, the calculations are made as if all treatments were standard for the various methods. For all calculations it is assumed that the uterus is 8 cm long, 5.5 cm wide between the tubal insertions, and 3.5 cm thick, and that the cervix is 3.5 cm in diameter.

Isodose curves are constructed in 2 planes—a median coronal and a horizontal through the widest portion of the coronal plane curves—for the following 4 methods: (1) the insertion into the cervix of small needles and a single capsule; (2) the method of Regaud and Lacassagne; (3) the massive dose method of the Memorial Hospital, New York; and (4) the Stockholm method. The 5 and 10 T S E D isodose curves are chosen because more irradiation than 10 skin erythema doses is likely to produce tissue necrosis, and less irradiation than 5 skin erythema doses will not destroy many types of cancer cells. The method of calculating isodose curves for multiple points in 3 dimensions is described in detail, and the results of these calculations

based upon the hypotheses set forth are presented by tables, charts, and drawings.

Lucas concludes that no one method can be used to the exclusion of others since clinical conditions vary so widely. No treatment which will deliver more than 15 T S E D at a distance of 1.5 cm from the source of the irradiation should be given as this amount is about the limit of therapeutic safety. This amount can be given by applying radium in the cervix for 3,500 mgm/hr with a filter equivalent to 0.3 mm of gold. The colpostat adds more irradiation to the area of lymphatic drainage of the cervix than any other and should be used whenever anatomical conditions permit. Bombs or plaques against the cervix add little to the field of attempted irradiation and may cause over irradiation of the cervix. In the vagina and uterus radium cannot be used in sufficient quantities to deliver a lethal dose to the average radioresistant cancer cell in the lateral parametria without delivering a lethal tissue dose to the vesical, rectal, and colonic walls.

DANIEL G. MORTON, M.D.

## MISCELLANEOUS

### CLINICAL ENTITIES—GENERAL PHYSIOLOGICAL CONDITIONS

Jeanneney, G. Surgery on Diabetics. Surgical Conditions in Diabetics (*La chirurgie chez les diabétiques*). Affections chirurgicales chez les diabétiques. *J. de chir.*, 1936, 48: 519.

By the use of insulin the incidence of various complications of diabetes, especially diabetic gangrene, has been greatly reduced. Diabetics are especially prone to develop boils and carbuncles. In the presence of such lesions medical treatment should be directed first to the diabetes (diet and insulin) and then to the infection (autohemotherapy, bacteriophage treatment). Autohemotherapy may be supplemented with radiotherapy. Large carbuncles showing no tendency to regress require operation.

In the presence of moist gangrene, the surgeon must first be assured that the diabetes is being adequately treated with insulin and then study the condition of the circulation in the affected limb. If there is no arterial circulation, amputation in healthy tissue is indicated. If the arterial circulation is conserved, amputation should be done if septicemia threatens or is established, or if there is an extensive deep infection which cannot be overcome by debridement. If the infection is less extensive, debridement and excision of necrosed tissue combined with active medical treatment with insulin and serum will usually save the limb.

ALICE M. MEYERS

Rous, P. The Virus Tumors and the Tumor Problem. *Am. J. Cancer*, 1936, 28: 233.

The chief factors against the theory that the general run of malignant growths are due to viruses are summarized and commented upon as follows:

1. The world wide occurrence of cancer. It is plain that the cause of cancer must be present wherever man is. But wherever he goes so do certain of his parasites.

2. The sporadic occurrence of cancers, suggesting lack of infectiousness. Tumors are highly conditioned diseases dependent upon heredity, age, chronic irritation, and other factors. The more a disease producing agent is conditioned in its activity, the less will the evidence become, until there is none, that it is infectious in character.

3. The failure of attempts to demonstrate an extrinsic cause for most malignant mammalian tumors. It is possible that this may have been due to technical difficulties rather than biological factors.

4. The hereditary determination of tumors. Tuberculosis was deemed hereditary before the tubercle bacillus was recognized. The appearance of malignant tumors of the same sort in identical twins, in cases of hereditary glioma of the retina, and in cases of von Recklinghausen's disease may mean no more than that, when the soil is right, a

carcinogenic agent, perhaps a virus, is effective when it would not otherwise be.

5. The experimental induction of cancers at sites where they normally occur. Experimentally produced tumors such, for example, as those resulting from tarring of the ears of laboratory animals, are not in the real sense tumors induced at will. Their incidence varies notably in different individuals, they occur at relatively few places in large areas subjected to the carcinogenic stimulation, they are punctate in origin, and though in any one individual their number may increase as the tarring or other stimulation is continued, no procedure employed has caused them to appear as diffuse processes or in large numbers. Some decisive condition or agent is evidently present at the sites where they arise.

6. The fact that cancer does not spring full blown from normal cells but develops as the result of gradual and often long continued changes. The changes induced by all the various carcinogenic agents may be of a sort to stimulate a symbiotic virus or viruses to pathogenic activity.

7. The occasional discovery of metastases of several different sorts, representative of more than one germ layer, in patients dying of a teratoma that became malignant. Many teratomas are supposedly derived from pluripotential sex cells. Therefore if one of these became infected with a tumor producing virus, diverse secondary growths would occur.

8. The enormous variety of malignant tumors. It is urged that since viruses are highly specific in their action, one causing osteochondrosarcomas of the fowl, for example, and another only endotheliomas, an entire microcosm of viruses would be necessary to account for all malignant tumors. This is an *a priori* objection. From studies of herpes and of submaxillary gland virus, the virus causing lymphocytic choriomeningitis, Virus 3, and others medical workers are now beginning to realize that the healthy body may have a virus population comparable with that of bacteria but far more considerable and diverse. Whatever the cause of rabbit cancers, it acts only upon epidermal cells and in these it produces changes taking a special direction, yet the variety of the resulting tumors—cystic tumors, malignant papillomas, squamous cell carcinomas—is not inconsiderable. The theoretical need for a vast multiplicity of viruses is lessened by such findings.

JOSEPH K. NARAT, M.D.

Mendizábal, P. Malignant Tumors in Mexican Children. Cancer in Childhood (*Los tumores malignos en los niños de México. El cáncer en la infancia*). *Ciruj. y cirujanos*, 1936, 4: 188.

Mendizábal reviews his experience with malignant tumors at the Children's Clinic of the Mexican General Hospital. Of 82 such neoplasms in children, 71 per cent were epitheliomas. The youngest child



was five years old. Among the epitheliomas were a basal cell epithelioma following xeroderma pigmentosum, an epithelioma originating in a naevus of the conjunctiva, a canceroid of the nostrils, and epitheliomas of the finger, tongue, and interdigital fold of the toes.

Mendizábal concludes that malignant tumors in childhood are less rare than is generally supposed. Most of the theories as to the origin of malignancy in the adult (irritation, traumatism, heredity) are not applicable to the child. The theory of embryonic inclusions and Wilms' blastomeric theory seem to fit many, although not all cases. Malignant growths are more frequent in boys than in girls. They are more common also in children of the poor than of those of the well, to do social groups, but the author attaches no importance to malnutrition and defective hygiene as contributing factors.

Clinically and histologically such tumors in children are more malignant than those occurring in adults and metastasize more frequently and extensively. In many cases of internal neoplasm invasion is remarkably silent, and although the evolution is very rapid the patient's general appearance remains deceptively good until a late stage. In cases of external tumor the local growth is easily confused with other lesions. The course of some of the deep tumors simulates that of an infection. All of the children whose cases are reviewed by the author were brought to the clinic at a late stage.

The results of radical operation and radium therapy do not correspond exactly to those obtained in later life, perhaps because of the greater malignancy of the same histological varieties and the weaker defence mechanisms of the child's tissues due possibly to endocrine disturbance. The reactions to radium treatment are much more severe and even when the irradiation is given properly are often fatal. This is due to an intoxication by catabolic products which are enormously increased by neoplasms with very marked karyokinesis and marked radiosensitivity, to the abundance of water and glycogen in the protoplasm, and to the toxic effect of the great numbers of normal young cells destroyed by the irradiation. M. E. MORSE, M.D.

Simon L. Statistics on the Operability of Cancer (Statistik der Operabilität des Krebses). *Monatsschr. f. Krebsheilkf.* 1936 4: 236.

The author has noted a decrease in the operability of patients with cancer who have come to his division of the Municipal Hospital at Ludwigshafen since 1915.

Whereas in the period from 1915 to 1927 49 per cent (378) of 777 patients were operable in 1933 only 28 per cent of 141 patients, in 1934 only 22 per cent of 105 patients, and in 1935, only 22 per cent of 135 patients could be treated surgically. Of the 378 patients who were operated upon radically in the period from 1915 to 1927 27 per cent remained free from recurrence for five years. Of the patients with cancer of the stomach 30 per cent were treated by radical operation and 30 per cent by gastro-enterostomy. In the cases of 40 per cent only exploration was possible. In the period from 1933 to 1935 the number of cases of cancer of the stomach operated upon radically fell to 17 per cent and that of cases of cancer of the large bowel to 24 per cent.

The statistics for cancer of the breast are even less favorable. Whereas in the period from 1915 to 1927 90 per cent of the cases were operable in 1933, only 83 per cent, in 1934 only 53 per cent, and in 1935 only 33 per cent could be treated surgically. Patients with cancer of the breast entered the hospital in constantly more advanced stages of the disease. In the period from 1915 to 1927 23 per cent were admitted in the Steintal I stage, whereas in 1935 none was admitted in this stage. In the period from 1915 to 1927 25 per cent, and in 1935 80 per cent, were admitted in the Steintal III stage.

This decrease in operability is attributed by the author partly to the Sick Benefit Association which does not approve of hospitalization for diagnostic study and limits observations to the shortest time possible. Whether the blood test of Klein, which is now widely used by general practitioners of the Palatinate when the presence of cancer is suspected, will be of further aid in early diagnosis remains to be determined. (R. GUTZERT)

J. DANIEL WILLEMS, M.D.

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MAY, 1937

## COLLECTIVE REVIEW

### CONGENITAL AND ACQUIRED DEFECTS AND DEFORMITIES OF THE FACE AND JAWS

A Review of the Literature for 1936

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#### CLEFT LIP AND PALATE

SEVERAL important papers on cleft palate have appeared during the past year. An interesting feature of the literature has been the discussion between Axhausen in Germany and Veau in France regarding the principles involved in its treatment. The monograph of Axhausen (1) has already been abstracted at some length (*Internat. Abst. Surg.*, 1936, 63:38). Axhausen recognizes the validity of the objections to the classical Langenbeck operation that have been advanced by Veau, but states that this criticism does not apply to the modern "bridge-flap" operation. He attempts to prove that by his modifications of the Langenbeck technique all the essential requirements laid down by Veau are fulfilled, and that the results are superior to those obtained by the Veau operation. The requirements are (1) an epithelial covering on the nasal side as well as on the palatal side of the flaps, (2) obliteration of the dead space above the palatal flaps, and (3) avoidance of muscle injury and union by suture of the separated palatal muscles. Veau, according to Axhausen, does not believe it possible to fulfill these requirements by using flaps left attached both anteriorly and posteriorly. Axhausen takes the stand that these requirements can be fulfilled by using bridge flaps. He prefers to operate at the end of the second year or the beginning of the third year, although it was noted that of 100 cases only 25 were operated on before the third year. There was no mortality in his 100 cases, which fact he attributes chiefly to the use of

local anesthesia. The more advanced age of most of his patients undoubtedly also helps to explain this fact. In both French and German journals Veau (32), (33) discusses the monograph of Axhausen, replying to some of the criticism of his own method contained therein. He points out that Axhausen's procedure is not really a modification of the Langenbeck method, and that the only feature of the original Langenbeck operation followed is the minor one of leaving the mucoperiosteal flaps attached at the anterior end. He shows clearly that Axhausen has adopted all of the fundamentals laid down by Veau, namely the keeping of the flaps up against the palatine vault (therefore they should not be called "bridge-flaps"), the suture of the nasal mucosa, and the suture of the muscles of the soft palate. Veau criticizes the technique of Axhausen because it requires the use of a postoperative prosthesis to hold up the flaps. This feature, he says, introduces an unnecessary complication requiring the collaboration of the dental laboratory.

The principles advanced by Veau and carried out in modified form by Axhausen undoubtedly mark a great advance in the technique of cleft-palate surgery and should be given careful consideration by all engaged in this work.

Riemke of Copenhagen (26) reviews the history of cleft palate operations, pointing out the disadvantages and ill results of the old Langenbeck, Brophy, Lane, and other methods. He goes on to describe the more modern modifications—Rosenthal's pharyngoplasty, the retrotransposition operations of Halle and Ernst, Lumborg, and

Dorrance, and finally Veau's operation, for which he predicts especially good results. He states that up to this date it has not been determined which of the newer methods obtains the best results.

Vaughan (31) finds that the best result in cleft-palate surgery is obtained if the operation is postponed until the patient is from eighteen months to two years of age or even older. The tissues are then in better condition to withstand the necessary manipulation, and the mortality is much lower than that of operation performed at an earlier age. He differs from many observers by the opinion that early operation is of no advantage from the standpoint of speech improvement. The so-called cleft palate 'speech' represents the inability of the child to prevent air from passing into the nose especially in the articulation of consonants. The Langenbeck procedure with modifications is Vaughan's operation of choice to close the palate cleft. Immobilization of the soft palate by the lead ribbon or tension relief wire is an important requirement of the operation. The methods developed by Dorrance and others in the past few years for lengthening the velum furnish a better functioning palate with improved articulation as an immediate result. If after repair of the cleft of the hard and soft palate by the Langenbeck operation, the soft palate is too short, Vaughan performs a second operation to lengthen it. As suggested by Ganzer, an incision is made opposite the canine teeth on each side and extended backward and inward to meet in the median line, leaving a V shaped section of tissue in the anterior part of the palate. The incisions are then continued from the canine teeth backward around the maxillary tuberosities and extended downward and external to the pterygomandibular ligaments to make an M shaped incision. The entire palate is then elevated and freed from its bony attachments. The hamular process is separated to release the tendon of the tensor palati. If the palate is not extremely short it can then be carried backward to touch the posterior pharyngeal wall. The lateral sections are then carried backward and the points of the 'M' sutured to the point of the V in the median line of the palate. The displaced tissues may also be held in their new position by wire sutures which extend through drill holes in the bone on each side. This method permits a much greater lengthening of the palate without the danger of an anterior opening in cases in which the cleft extends for a considerable distance into the hard palate.

Brown (3) describes a modification of the "push back" operation for elongation of the partially cleft palate. The principle of the procedure is that a direct flap of practically the entire palate is raised completely free from the bone and immediately set back so that the anterior free edge is anchored clear back at the posterior edge of the bone. The major palatine arteries are definitely preserved and left to supply the palate flap. The palate is allowed to heal in this position, and the bony palate to acquire a complete covering of epithelium. At a second operation, the palate cleft itself is closed.

This operation has been performed on 32 patients. Twenty five present excellent results, the 7 others have not undergone the final operation.

Padgett (24) reports a series of 141 cases of cleft palate operated on unsuccessfully at an earlier date. The average number of unsuccessful operations per patient was 2.3. Fifteen patients of the group had been operated upon primarily by Padgett and 126 had been operated upon by other surgeons. The cases are primarily divided into 2 large groups: (1) those with little or no loss of tissue, and (2) those with a definite loss of tissue. The principle of the Dieffenbach Langenbeck operation was used in most of the cases with little or no loss of tissue. When the palate appeared to be unusually short, but sufficient tissue was still available to gain a good midline closure, the principle of uniting the posterior pillars as advocated by Brophy, Blair, and others proved of value. For a defect between and back of the cleft alveolar ridge, a flap from the lip with the base at the midline and the raw surface toward the mouth was found to be of value.

In the group of cases with loss of tissue the following types of defects were encountered: (1) a large midline loss in the central part of the hard palate; (2) a loss of a part of one of the flaps of the hard palate; (3) a hole in the anterior or lateral palate adjacent to the alveolus from which the mucoperiosteal covering has been lost; (4) a large defect at the juncture of the hard and soft palate; (5) a considerable loss of soft palate tissue; and (6) an almost complete loss of the tissues of the hard palate. Padgett describes in detail some of the procedures used to close the different types of defect. In large defects of the soft palate a posterior pharyngeal flap was used to advantage. This permits a one-stage operation that will successfully close a defective soft palate that could hardly be closed in any other way.

Nine cases of almost complete loss of both the hard and soft palate were treated by the use of extra oral tissues. Statistical tables of the results are presented.

Wardill and Whillis (35) have had an opportunity to observe the mechanism of the movements of the soft palate in a patient who, as the result of operation for carcinoma, had a wide opening through the lateral wall of the nose and orbit, through which the whole of the nasopharynx could be examined readily. The method of examination was visual observation from above and below, under direct and transmitted illumination. The palate was examined at rest, during speech, during deglutition, and during blowing. From these observations the authors conclude:

It is difficult to interpret the movements of the palate in all phases of its activity and to correlate them with the individual muscles. The diameters of the normal nasopharynx are very much smaller than might be imagined from the examination of a series of cases of unrepaired clefts of the palate. All movements are extremely speedy and, on superficial examination, little difference is observed between the nasal resonants and the explosive consonants. But in general it may be said that the greater the explosive effort required for the production of a sound, the greater is the elevation of the palate and the more firm the nasopharyngeal closure. It seems that closure is considerably assisted by the heaping-up of the mucosa by the underlying muscles and, on the basis of clinical experience, it may be assumed that complete nasopharyngeal closure is possible with an almost completely immobile soft palate so long as the sling action of the levators remains intact. The tensor palati appears to have little to do with the speech mechanism, its activity is strongest at the time of deglutition. It must be regarded as a muscle, the function of which is to propel the bolus over the back of the tongue.

Beatty (2) made a valuable contribution on the general care of patients with cleft palate. He rightly considers that certain other matters are almost if not quite as important as surgery—important both in preserving the health of the child until operation and also in securing satisfactory functional results through surgery and observation afterward. These matters are just as essential but not emphasized as often as some particular surgical technique.

Beatty reports a series of 318 cases, in which approximately 393 operations were performed. He recommends that the surgeon selected to do the operation should see the patient soon after

birth to outline his surgical procedure and, together with a competent, alert, well-trained pediatrician direct the care of the patient up to and through the various steps necessary to correct the deformity. These patients are never an emergency surgically. None of them dies before operation as a result of the deformity. If death occurs it is due to faulty or incorrect feeding methods, an improper formula, or some intercurrent disease. The proper amount of the proper formula for the particular patient must be established before operation. An infant that is improperly fed and dehydrated, and with a probably disturbed gastro-intestinal tract is one of the poorest known risks for operation. Babies with a "thymus shadow" or any tendency toward visible lymphoid-tissue hyperplasia are given a more detailed study than usual. For some time before operation they receive iodine medication in the form of Lugol's solution, or proportionate doses of thyroid extract, those with an enlarged thymus shadow are given several x-ray treatments. Beatty believes that this pre-operative treatment has a marked effect in reducing the severe reaction at operation. He calls attention to the frequency of ear and sinus complications in cases of cleft palate, and the necessity for special consideration from this standpoint. He gives a very detailed list of instructions for nurses and interns regarding pre-operative and postoperative care, which contains many valuable suggestions. After a discussion of the surgical technique, he analyzes the 318 cases from the standpoint of mortality, and reports 7 deaths. He summarizes as follows:

- 1 Periodical observation of the patient from the time of birth to the time of operation has been a distinct advantage.

- 2 In addition to the usual pre-operative examination in surgical cases, special examinations must be made. This is particularly important in patients two years of age or younger. The results of the various examinations should be carefully correlated by the surgeon himself to determine whether any may contra-indicate operation.

- 3 Special preparation of the patient for some time before the operation reduces the post-operative reaction to a minimum.

- 4 Intelligent, attentive nursing under the direction of a dependable supervisor, experienced in the care of this class of surgical patients, is absolutely necessary.

- 5 Early closure of clefts of the alveolar process and clefts of the hard and soft palate, before the patient begins to speak, is advisable.

6 Speech training should be begun soon after the operation. It is a long process but much can be accomplished by a competent instructor if full co-operation can be secured.

At the meeting of the British Medical Association at Melbourne, Australia, in 1935, the Section on Paediatrics held a symposium on harelip which brought out some interesting discussions. Stephens (28) emphasizes the fact that the problem is not so much the union of the lip as the creation of a satisfactory nostril. For the usual unilateral case he prefers the single flap operation of the Mirault type selecting usually the medial side for the flap, however if conditions seem more suited for a flap from the lateral side he adopts the Blair Brown technique. He states that, while this method is complex and liable to lead to failure if the incisions are not absolutely accurate, a lip and nostril as nearly perfect as possible can be obtained in carefully selected cases. Further warm praise for the Blair modification of the Mirault operation comes from Brown of Brisbane (4). He also lays stress on the importance of the flattened nostril in cleft lip. Brown utilizes the Blair technique in all cases, and describes it in detail. He also discusses the correction of secondary deformities. Brown is strongly of the opinion that cases of cleft lip and palate should be referred to the surgeon most suited to do the work, and not treated in the haphazard manner that is generally adopted. Better primary operative repair would unquestionably result were this plan carried out, and much of the difficult secondary work that is now needed would be avoided. Fagge (10) discusses several difficulties in the treatment of cleft lip which he has encountered in a wide experience. He finds that the position of the upper lip relative to that of the lower is not altogether under the control of the operator. Although he no longer removes the premaxilla or forces it backward in a bilateral case, yet he finds that a certain degree of flattening of the upper lip results in many cases when no bone plastic has been attempted. He believes that the accuracy of apposition of the muscle layer and the freedom from adherence to the alveolus are the chief factors which insure normal function of the lip. When adhesion has occurred, he finds that the application of an Esser infusor under the lip gives satisfactory mobility. He prevents adhesion by turning back the mucous-membrane edges of the cleft instead of paring them away, and suturing them together beneath the lip. In closing the cleft Fagge follows essentially the technique of Mirault. He corrects the spread ala

and distorted nostril by advancing the tissues on the nasal septum after splitting the columella longitudinally. He has no satisfactory means of reproducing the normal internal concavity of the ala. In double harelip Fagge does not include the premaxillary skin flap in the lip, but frees it and carries it upward to aid in lengthening the columella, thus bringing forward the tip of the nose. The edges of the lip defect are brought together beneath this flap.

Haentzschel (14) reports the results of statistical research in 128 cases of cleft lip, jaw, and palate from different hospitals in several localities, where many different methods of operation have been used. It was found from the outset that facial clefts are the most common of all congenital deformities. In 20.4 per cent, the factor of inheritance in ascent or descent could be demonstrated. In the remaining 80 per cent a hereditary cause must be assumed since there is no possibility of otherwise explaining the occurrence of facial clefts and these clefts are very often combined with other hereditary defects. The belief that these defects are caused by maternal impressions (fright by a dog and the like) has been completely discredited. The deformity is congenital and not due to amniotic bands. Thirty-five and one-tenth per cent of the reviewed cases showed other anomalies and deformities, above all, a slight grade of congenital feeble-mindedness. The latter eugenically dangerous condition occurred in 11.7 per cent of the cases of cleft palate, or 8 times more frequently than in the general run of people. Also, the relatives of one-fifth of all the patients were affected (nervous diseases, epilepsy, feeble-mindedness). The operative result in all forms in general is poor regardless of the time of operation or the technique employed. Speech improvement after the operation depends upon the will and the intelligence of the patient. Good speech results were obtained only in about 7 per cent of the cases. Follow-up investigations have shown also that failures in school and daily life are due to the accompanying inferiorities. The incidence of marriage is independent of the severity of the deformity or the success of the operative result. More than half of the married patients with clefts were united with definitely inferior partners. All forms of cleft, from the slightest lip split to the most pronounced facial cleft, must be regarded as hereditary afflictions. The operative correction can never set aside the hereditary pathological tendency. Haentzschel concludes that because the hereditary genesis must be regarded as valid in all cases, sterilization of all individuals

with clefts must be promoted in order to prevent propagation of the diseased stock.

At the Seventh Congress of the Société Internationale de Logopédie et de Phoniatry, held in Copenhagen, Veau and Borel-Maisonny (34) reported on the speech results following cleft-palate operations performed by Veau. They examined 200 subjects between four and twenty years of age clinically and fluoroscopically and found 52 per cent with absolutely normal phonation. By means of the x-rays they discovered the anatomical explanation of certain apparently paradoxical facts in the speech of their patients. The cases are divided into 3 classes according to the physiological results.

*Class I* The cases with a normally functioning velum assuring complete occlusion (149, or 74.5 per cent). Under the x-rays it was seen that the occlusion was brought about in 2 ways

A In a strictly normal manner against the postpharyngeal wall (114, or 57 per cent)

1 Without any difficulty of velar articulation and with absolutely normal phonation (82, or 41 per cent)

2 With slight velar articulation difficulty, intermittent or exclusive of 1 or several consonants (32, or 16 per cent)

B By compensatory mechanisms at abnormally situated points of occlusion (35, or 17 per cent)

1 Without any difficulty of phonation (22, or 11 per cent)

2 With slight difficulty of phonation (13, or 6.5 per cent)

The total number of patients with perfect phonation, who had no trouble with articulation, regardless of the mode of occlusion, was (82+22) 104, or 52 per cent. The others who, with a perfect velum functioning normally, retained some isolated difficulties in articulation, numbered (32+13) 45, or 22.5 per cent.

*Class II* The cases in which the nasopharynx was closed only during deglutition (41, or 20.5 per cent). They all presented a mobile velum, but it was deficient during phonation.

This intermittent occlusion occurred in 2 ways

A Against the postpharyngeal wall (28, or 14 per cent)

B By compensating mechanisms (13, or 6.5 per cent)

With muscular education, 10 of the 41 patients may be placed with those in Class I. These 10 represent 5 per cent of the total number.

*Class III* The cases in which occlusion was not present either during phonation or degluti-

tion in spite of evident mobility of the soft palate (10, or 5 per cent)

A Those presenting no compensatory movement (8, or 4 per cent)

B Those presenting a compensatory movement of the pharyngeal wall (2, or 1 per cent)

Radiological examination gave the explanation of paradoxical facts—certain patients had a short velum and spoke normally, while others had a long velum and their speech was mediocre. The explanations are

1 In normal phonation with a mobile but short velum, the nasopharynx was found to be so narrow that the slightest movement of the velum sufficed for occlusion (20)

2 In patients with a very deep space anteroposteriorly, occlusion was easy because of the mobility of the velum toward the postpharyngeal wall (12, or 6 per cent)

3 A small number of patients presented vegetations upon which the velum rested (8, or 4 per cent)

4 In the largest number of patients velopharyngeal occlusion was assured by the development of posterolateral pharyngeal folds (13.5 per cent)

Factors in phonetic failure were found to be (1) the size of the nasopharyngeal space, (2) holes in the palate, (3) surgical failures, and (4) mental retardation.

The authors conclude that in order to obtain the best speech results, operation must be done as early as possible. Retarding the operation diminishes the chances of obtaining normal phonation. In the adult, the operation becomes a needless luxury if it does not give phonetic results superior to those of a prosthesis.

Castaneda, Roccatagliata, and Garzon (5) observed a rare case of congenital occlusion of the left choana in a girl of fourteen years. They were able to establish a permanent passageway, and gain access to the membranous osseous obstruction after removal of the posterior third of the inferior turbinate.

#### ACQUIRED DEFORMITIES

The literature for 1936 brings out little that is new in the principles of repair of acquired deformities and defects of the face and jaws.

New and Figg (21), and Owens (23) review these principles and give examples of their application in the repair of defects involving the lips, cheeks, and other parts of the face, secondary to the removal of malignant tumors. New and Figg discuss at some length the opportune time for

repair in these cases. Generally speaking, reconstruction should be delayed somewhat longer following treatment of a squamous cell epithelioma than after treatment of a basal-cell growth and longer after the removal of a highly malignant lesion than after the removal of an inactive lesion. Most recurrences following the removal of malignant neoplasms take place within six months or a year. Accordingly, in the cases of elderly individuals who have had tumors of a low grade of malignancy, repair is justifiable after the patient has been well for from six to eight months while in cases of younger patients, or with more active and extensive growths it is better to delay reconstruction for at least a year. Immediate repair is frequently possible after excision of carcinoma of the lower lip, and several procedures such as Estlander's operation are suitable for this purpose. Immediate repair should never be carried out unless the lesion can be removed together with an adequate margin of normal tissue. This is practically impossible in cases in which the carcinoma has invaded the bone in these the repair must be delayed and usually requires the use of tissue from a distance in the form of pedicle flaps from the forehead, neck, arm, thorax, back, or abdomen.

Owens has written an article along somewhat the same lines, and he reaches the following conclusions:

1. Facial defects following the radical extirpation of cancer are modified by the resulting loss of tissue, and therefore, the method of repair indicated is determined by the extent and location of the deformity.

2. Growths involving skin over cartilage should not be subjected to radiation because of the high percentage of cartilaginous destruction which follows this procedure. The treatment of cancer by x rays or radium should always be given by a specialist competent through long experience to apply radiation in amounts that are adequate. Too frequently patients are seen who have received inadequate radiation and as a result seek treatment because of late manifestations of lesions which are hopelessly advanced. Microscopic study, by means of the frozen section method, of all tissue removed, should be routine. By means of this technique involved tissue will frequently be removed which would otherwise have been permitted to remain because of its normal macroscopic appearance.

3. Much can be accomplished in the correction of defects resulting from the eradication of cancer. Many patients will be less skeptical in subjecting themselves to the eradication of a growth if they

can be assured that unsightly deformities will not be a necessary sequel.

Kazanjan (18) has written a very complete paper on the repair of deformities resulting from burns especially of the eyelids, cheeks, lips, neck, and axilla. He describes the uses and technique of various types of skin grafts and flaps, reporting 11 illustrative cases in detail.

The number of articles in American and foreign literature on the esthetic phase of facial surgery attest the very great interest in this subject. It is possible here to give the references to only some of these papers. Under this heading may be mentioned those by Malbec (20), Torres Estrada (30), Ramirez (25), Codazzi Aguirre (6), Cohen (7) and Kahn (17).

Federspiel (12) reports several cases illustrating various types of congenital and acquired deformities of the nose, lip, and premaxilla, including hump-nose, long overhanging tip, rhinophyma and secondary deformities of the lip and premaxilla resulting from cleft palate.

Major defects of the nose are discussed by Straith (29), Faltin (11), and Dobrzaneczki (8).

The purpose of Straith's paper is to demonstrate the feasibility of successful rhinoplastic reconstruction without recourse to extrafacial sources for skin grafts, thereby avoiding unsightly secondary facial blemishes. Regarding reconstruction about the nasal tip he says:

1. Small skin defects are readily covered by Wolfe grafts obtained from the upper eyelid or posterior aspect of the ear.

2. Defects of the ala nasi may be corrected by delayed pedicle flaps rolled down from the side of the nose, the normally rounded alar border being formed by the rolled edge. The resulting defect at the side of the nose is then covered by a Wolfe graft (Ferns Smith). This method is best reserved for small lesions. Restoration of the base of the ala may be accomplished also by delayed pedicle transfers from the region of the nasolabial folds.

3. Skin and soft tissue losses at the nasal tip in women especially when extensive are best treated by forehead flap transfers. The forehead scar which remains after Wolfe grafting is concealed by the hair. The disadvantage of this method in men lies in the inability, except in unusual cases, to conceal the forehead scar by the hair. To avoid these unsightly scars in men the author has devised a method by means of which skin from below and behind the ear may be transferred to the nose on a tube pedicle via the sternal notch. This method has several distinct advantages: (1) forehead scars are avoided,

(2) the skin matches the nasal integument and is practically hairless, (3) the skin is thin and easily molded to shape, and (4) the resulting neck scar is inconspicuous

In depressions of the nasal bridge, the introduction of rib cartilage transplants can sometimes be avoided by the use of the author's recent extension of the Kazanjian operative principle (eversion of the lateral wings of the alar cartilage and suturing them back to back to support the nasal tip) The author augments this procedure by including also the upper lateral cartilages These are first cut according to the depth of the bridge depression and then everted They are next stitched back to back with 2 sutures of chromic catgut Horsehair-mattress sutures passed through the everted cartilage flaps and tied over rolls of gauze help to maintain their upright position The absence of a nasal septum strong enough to support the everted cartilages is an important contra indication to this procedure

Faltin has often observed a typical deformity after lupus of the nose In these cases the tip of the nose, the medial parts of the alae, and the septum are missing, the nostrils are more or less stenosed, and the alae are drawn up by the cicatrization The author gradually developed a procedure for the treatment of these cases He makes a transverse incision to permit drawing down the remains of the alae with their borders and making use of them in construction of the new nose, as it is impossible or very difficult to imitate these structures in a satisfactory manner by other means Additional tissue for the rhinoplasty is obtained in the form of a tubed pedicle flap from the neck or the arm The nose is given its permanent form by several little operations excision of superfluous subcutaneous fat, application of molding mattress sutures, and introduction of small pieces of cartilage for the tip and columella It is often of advantage to use an intermediate step with the pedicle, suturing it at the border of the lower jaw to insure good circulation while doing the molding operations Among the advantages of the tubed pedicle are to be noted that the patient need not suffer from the presence of disagreeable suppurating surfaces near to his face, and that the flap by its cylindrical form lends itself very well to construction of the new nose Three typical cases illustrate the procedure

Dobrzanecski reports a case of bull dog nose, a rare malformation thus named by Trendelenburg Radiographically (Bumba and Lucksch), a diastasis of the nasal bones proper with enormous widening of the nasal cavities is clearly seen

There is a duplication of the cartilaginous septum The nasal bridge is flattened and broadened, especially at the root, and in the reported case there was a rounded bony prominence above The middle portion of the nose was covered by hypertrophied pigmented skin, rich in sebaceous glands Reconstruction of the nose was undertaken in 3 stages At the first operation the bony bulging at the root of the nose was removed by means of a dorsal incision and the skin covering was incised on each side as far as the pyriform opening The perosteum was divided 1.5 cm from the border of the pyriform opening, and the nasal process on each side was cut through in such a way that the bony fragments were left attached solely by the mucous membrane of the nasal cavity These fragments were brought closer together by pressure toward the median line and held in position by the screw pads of Joseph At the second operation, performed after four weeks, the middle portion of the hypertrophied skin was removed After three more weeks the tip of the nose was elevated and the depression caused by the spreading of the alar cartilages, which gave the aspect of a bifid nose, was obliterated This was accomplished through a median columellar incision, exposing the inner portions of the alar cartilages, and bringing them together with a few silk sutures By this means, instead of a flattened and bifid nose, a pointed nose was obtained

A review of this kind would not be complete without calling attention to the second edition of Sheehan's "Plastic Surgery of the Nose" (27) This book has been almost completely rewritten and covers all possible defects and deformities in a most systematic manner

#### EYELIDS, ETC

Wheeler (36) discusses the sources of grafts for plastic surgery about the eyes High authority to the contrary, he advocates the use of detached grafts in preference to attached flaps, whenever it is feasible for the surgeon to choose A pedunculated flap is required if a proper bed cannot be prepared to receive a skin graft, for example, when there has been a deep wound below the eye with a bone injury near the orbital margin and a quantity of scar tissue has partially filled in the depression Another condition that demands a pedicle flap is a hole in the nasal cavity where there is no bed to receive a free graft

For restoration of an eye socket, Wheeler chooses an epidermal graft from the outer aspect of the thigh, without glands or hair follicles, and without perforation For eyebrow restoration, a full-thickness graft from a fellow brow is best



The graft is turned about and placed in its bed with the hairs slanting in the right direction. In case a fellow brow will not furnish a good graft, the occipital or temporal region of the scalp will give a rather good detached graft, which can be trimmed by the patient when the hairs get too long. For eyelashes a graft from the lower part of the brow can be used.

In ectropion a detached graft of upper eyelid skin is best. Next best is skin from the cephalo-auricular angle. In some cases of very severe burns neither the upper eyelid skin nor the cephalo-auricular angle skin is available in sufficient quantity. For such rare cases an epidermal graft from the outer aspect of the thigh will answer.

For tilting a depression about the orbit Wheeler finds fascia lata superior to muscle, bone or cartilage. He claims that it remains indefinitely with little change provided the wound over it is secure, and it adapts itself to cavities of any shape.

Wiener (37) describes several procedures for the correction of defects due to paralysis of the muscles of the eyes and lids. For ptosis, he employs 2 principles:

1. When a sound superior rectus is not available the modified Leter operation with the fascia lata hammock from the occipitofrontalis gives satisfaction.

2. When the superior rectus is active he employs a modification of the Motais operation. The tarsus is exposed by an incision across the center of the upper lid near the upper border of the tarsus and the main portion of the levator near the tarsus is exposed between 2 hooks. Two sutures are placed in the tarsus close to the insertion of the levator and the latter is then cut off about 6 millimeters from its tarsal attachment. With a straight, blunt scissors a pocket is made through the levator and fascia about 15 millimeters above the upper border of the tarsus and through the conjunctiva into the upper cul-de-sac. The speculum is introduced and the conjunctiva is dissected down to expose the superior rectus tendon which is freed of capsular attachment. The sutures are drawn into the upper cul-de-sac and sewed 1 to each side of the superior rectus tendon about 5 millimeters back from its insertion. Fine silk sutures are used. No suture is required for closure of the conjunctival incision and only 1 skin suture is necessary in the lid. The eye is protected with a light dressing by pulling up the lower lid by means of a broad piece of adhesive stretched from the cheek to the forehead which eliminates pull on the upper lid and effectively covers the globe. No dressing is needed after forty-eight hours. The adhesive

strip is applied at night until the lid closes of itself.

In sagging of the lower lid from facial palsy, Wiener has obtained fairly satisfactory results by excising a triangular piece from the temporal third of the lower lid with the lid margin forming the base and the apex down. The cut edges are drawn together with deep sutures thus tightening the lid margin and bringing it flush with the globe. Another method he suggests is to anchor a strip of fascia lata to the internal canthal ligament, run it under the lid margin subcutaneously, and sew it tightly stretched to the external canthal ligament and perosteum of the outer orbital margin.

#### EARS

Graham (13) points out the difficulties in correction of defects of the external ear. He describes methods of repairing various types of deformity, such as large ear, outstanding ear, small ear, and partial and total absence of the external ear. For the outstanding ear, he advocates removing an elliptical piece of skin and cartilage from the posterior surface of the ear and then closely approximating the edges of the cartilage and skin separately. This is far superior to the older operation of suturing the posterior raw surface to the skin of the mastoid region, which left resistant scar tissue in the mastoid furrow. For a recent hematoma of the ear needing with a syringe is the best treatment, but if the clot has organized it may be removed or, better still, a tight bandage may be placed over pressure gauze and left for two weeks.

Congenital absence of the concha is as a rule associated with defects in the external canal, and the middle and internal ear. It is useless to make an opening to a non-existent middle ear or to a non-reacting labyrinth but if hearing is present an effort to improve it by establishing a canal is justified. It is a great help to the patients if they can locate the direction from which sounds are coming and this faculty is improved immensely by establishing a canal. Graham reports 7 cases illustrating his method of forming a bony canal to the middle ear.

Frisner and Myers (9) describe a variation of the pedicle flap for epithelialization of the radical mastoid cavity which has given satisfactory results in 2 cases. In their procedure a racket shaped pedicle flap is taken from the lower angle of the mastoidectomy incision which is extended into the skin of the neck. The flap is turned up into the mastoidectomy cavity to line the raw surface and held in place by a packing of plain gauze, which is led through the external auditory meatus.

The anterior and posterior lips of the mastoidectomy wound are closed over the flap, and after scarification of the skin surface of the pedicle, the edges of the neck wound are closed over it

#### JAWS

Several writers discuss deformities and malrelations of the jaw bones. Kazanjian (19) reviews the various procedures that have been suggested for the correction of protrusion of the lower jaw. For those cases which do not respond to orthodontic treatment, 2 types of operation have been developed. In the first, a horizontal cut is made through the ramus of the mandible somewhere above the occlusal plane of the teeth. The body of the mandible is then pushed backward to the desired position and immobilized until consolidation of the bone is complete. This operation is simple in conception, but its chief handicap is the occasional inability of the operator to control the upper fragments. It was first advocated by Babcock, and successful results are reported by Pichler, Bruhn, Kostecka, and many others. Kazanjian prefers the second method, which consists in removing a measured section from each side of the body of the mandible, preferably in the first molar region, pushing back the anterior fragment into its new position and immobilizing it with dental splints made previously for that purpose. Blair performed the first successful operation of this kind in 1898. Kazanjian had previously reported 5 cases and now adds 3 more.

In the same article bilateral retrusion of the mandible is also discussed by Kazanjian, with a report of 3 cases. This condition may be congenital in origin, but usually it is due to trauma or infection in early childhood. Some cases are associated with bilateral ankylosis of the mandibular joint. Kazanjian treated 1 case by dividing the body of the mandible diagonally, pulling the chin forward and fixing it until union occurred in the new position. The chin was built out further in front by the insertion of an osteoperiosteal graft from the tibia. In a second case, the bone was divided horizontally by dental burs on each side from just above the angle to the premolar region and then the incision was carried up vertically to the alveolar ridge. This permitted the anterior part of the mandible to be brought forward and fastened by splints with the teeth in occlusion. Rib cartilage was used later to add to the prominence of the chin. In a third case, the lower jaw was built out to a satisfactory contour by placing a piece of costal cartilage in front of the symphysis.

In unilateral shortening of the mandible, Kazanjian prefers to bring about lengthening by the L-shaped or oblique osteotomy, thus obviating a second operation for bone grafting.

Ivy and Curtis (16) describe a case of unilateral lack of development of the left half of the mandible in a woman twenty-seven years of age. The lack of bone was the result of osteomyelitis at the age of seven. Three operations were done at intervals of several months. They consisted in (1) section through the body of the mandible on the short side, bringing the chin forward and restoring occlusion of the remaining teeth, (2) restoration of the continuity of the mandible by a bone graft from the crest of the ilium, and (3) improvement of the symmetry of the face by the implantation of costal cartilage over the flattened external surface of the bone. The treatment was completed by the insertion of artificial dentures.

Hofer (15) corrects this unilateral deformity by making a vertical section through the ascending ramus on the short side. This is carried out by means of a Gigli saw passed just in front of the angle behind the ascending ramus and out through the semilunar (sigmoid) notch. The short side of the mandible can then be drawn forward and fixed in position by means of dental splints until union occurs.

Oehlecker (22) reports a case of unilateral deformity of the lower jaw due to an osteoma of the condyloid process on the left side. The mandible had been pushed forward and to the right, with great disturbance of the occlusion of the teeth. On the sound side the condyle was displaced somewhat externally. Operation consisted in resection of the enlarged and deformed condyle through the Arhausen Bockenheimer approach from behind the ear.

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# ABSTRACTS OF CURRENT LITERATURE

## SURGERY OF THE HEAD AND NECK

### HEAD

Straith, C. L. The Management of Facial Injuries Caused by Motor Accidents *J Am M Ass*, 1937, 108 101

Driver injuries because of the relative protection afforded the driver by the steering wheel to which he may cling for support are the least frequent of facial injuries resulting from motor accidents. The driver may emerge free from injury, the chin may strike the center of the wheel, or a typical steering post injury, laceration and contusion of the chin associated with fractures of the mandible may result. When the force is greater the face is thrown down on the steering wheel and the upper jaw receives the brunt of the blow.

Guest passenger injuries, i. e., injuries of persons riding in the front seat beside the driver are more frequent. Lacking the support of the steering wheel a guest passenger injury is sustained when the head strikes the instrument panel with resultant crushing of the mid-portion of the face. These injuries, chiefly fractures and depressions, involve the maxilla and the nasal and malar bones, as well as the orbit and eyeball. Projecting objects on the instrument panel (handles, knobs, and cranks) add to the hazard.

Every effort must be made at the onset to conserve tissue. Therefore severed portions of skin (after removing the subcutaneous fat) should be replaced immediately and sutured in place in the manner of a Wolfe graft. Similar treatment should be given to ears and nasal tips that have been partially or almost completely severed.

Fractures of the malar bone if left untreated, produce very conspicuous deformities. Therefore, every effort should be made to restore and maintain the proper elevation.

The preparation, adjustment, and proper fitting of jaw splints for maxillary fractures require special technique and equipment that is not always available. For the surgeon not skilled in this method Federspiel's technique provides a simple and satisfactory alternative. A No. 12 gauge, preferably half round steel wire is firmly attached to the teeth of the upper arch. Brass fracture wire is then looped around this wire in the bicuspid region on each side. The ends of these wires are then threaded on a large curved needle and passed through the cheek just above the malar bone on each side. A plaster head cast with coat hanger wire attachments embedded in the plaster is next applied. The maxilla is then forced upward into proper position and maintained there by joining the ends of the brass wire to the attachments on the head cap. This method permits

cleansing of the mouth and an accurate adjustment of the upward traction on the maxilla.

Risdon has suggested a simple method of applying an arch wire. A long wire is twisted firmly around each last molar. The wires from each side are then brought to the front and twisted together. These arch wires are then firmly wired to all of the teeth of the upper jaw. The traction wires are then attached to this wire arch as described.

For mandibular fractures, the intermaxillary loop method of wiring is the best method in the absence, of course, of associated maxillary fracture. When both jaws have been fractured, the maxilla is treated by Federspiel's method. After fixation of the maxilla, an arch bar is wired to the mandible and elastic traction is then applied between them. Bands cut from a quarter inch gum rubber tube serve the purpose nicely.

Anterior displacements of the mandibular angle or the posterior fragment are held back by silver wire looped through drill holes in the angle of the mandible. These wires are then attached to hooks embedded in a plaster head cast (Ivy).

JAMES B. BROWN, M.D.

Ivy, R. H., and Curtis L. Adamantinoma of the Jaw *Ann Surg*, 1937, 105 125

Adamantinoma or ameloblastoma is a tumor of the jaws, usually multilocular and cystic in character, derived from the enamel forming cells of the dental epithelium. It appears as a slowly growing painless expansion of the bone, usually in the molar region of the mandible. A cavity divided into numerous compartments by fibrous or bony septa gradually forms in the bone. Some of the spaces are cystic, containing fluid, while others are filled with solid tissue. The epithelium is cuboid or columnar, and arranged in strands or alveoli surrounding a stellate reticulum. The epithelial cells are invasive in character, so that local recurrence, due to incomplete removal at operation, is not uncommon. Metastases are extremely rare.

The authors report 16 cases, 15 involving the mandible and 1 the maxilla. Seven occurred in males and 9 in females. Eleven patients were white and 5 were Negroes. Three cases are given in detail.

From their experience, the authors conclude that primary complete resection of the portion of the jaw involved, rather than curettage, is the most satisfactory treatment in the majority of cases.

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In order to obtain better esthetic results and to find a method of treatment which is not followed by

Perivasculitis retinae in young adults causes an inflammatory cellular exudate within the vessel walls which is usually confined to the veins. A similar condition probably affects some of the intra cranial vessels. Perivasculitis retinae probably manifests itself frequently as the clinical condition described as recurring hemorrhage in the vitreous of adolescents. The cause is not definitely determined although a good many of the cases are associated with active tuberculosis. The case which was reported appeared to be due to an unknown infection.

It is possible that perivasculitis retinae is not a single disease but rather a notable clinical phenomenon common to several diseases of different etiology and distinguished from each other clinically by such features as a difference in the age incidence, localization of the changes in the veins alone or in both arteries and veins, the more or less peripheral situation of the early lesions, the rapidity of the pathological process, the occurrence of vitreous hemorrhage and the presence of disturbances of the central nervous system.

JESSEL L. MCCOY, M.D.

#### EAR

Mayer O and Fraser J S Pathological Changes in the Ear in Late Congenital Syphilis *J Laryngol & Otol* 1936 51 755

The authors state that the principal changes in the ear due to late congenital syphilis are bone lesions—osteomyelitis, gummosa, periostitis, gummosa and periostitis productiva. Other changes are usually caused by disturbances in the bone which surrounds cavities and canals, invasion of which is very easy.

In all of the cases examined the authors found serous labyrinthitis in the cochlea and vestibule either florid or cured. This is probably due to miliary gummas in the endosteum of the labyrinth which set up a serous exudation leading to slight proliferation of tissue in the scala ectasia of the ductus cochlearis and lastly pronounced shrinkage of the membranes, atrophy of the organ of Corti and degeneration of the maculae.

In the semicircular canals the chief finding is productive inflammation in the perosteal layers. Constant endosteal proliferation of tissue and bone leads to concentric narrowing of the lumen. The endolymphatic space usually remains patent, and the endolymph flows freely.

More rarely a gummatous inflammation consisting of small miliary gummas or large ones which fill the entire canal accompanies this periostitis productiva.

This specific tissue may erode the semicircular canal interiorly, causing eruptions into neighboring marrow spaces.

Gummosis osteomyelitis leads to extensive changes of structure in the labyrinth capsule. It attacks most frequently the region of the semicircular canals

at the margin of the perosteal capsule but invades the labyrinth. Deficient replacement of the resorbed bone may result in osteoporosis of all ear bones and the petrosa.

In the ossicle, osteomyelitis generally causes ankylosis of the malleo-incudal joint.

In the reviewed cases the formation of osteophytes was found in the oval window. Stapedial ankylosis had not occurred, but there was a specific infiltration of the annular ligament which may have caused softening.

In the os tympanicum there were gummas, necrosis of the bone and consequently a cholesteatoma in the external meatus.

The nervous system showed lesions due to miliary gummas in the ganglion spirale and to gummatous inflammation in Rosenthal's canal and the internal meatal fundus, particularly in the fovea centralis and superior.

The affection is extremely insidious. In all of the cases examined there were fresh inflammatory processes in spite of the long duration of the condition. Subendosteal periostitis in the semicircular canals seems particularly apt to flare up again and again. Fresh lesions are seen close to healed lesions.

These findings explain the lack of uniformity of the results of functional examination of the labyrinth.

JAMES C. BRASWELL, M.D.

Lawson L J Osteomyelitis of the Sphenoid Bone. A Report of 2 Cases. *Arch Otolaryngol* 1937 23 1

Lawson states that in the first of his 2 cases of osteomyelitis of the sphenoid bone an unusual amount of destruction of the sphenoid body occurred before diffuse fatal basal meningitis developed.

In the second case, neither meningitis nor thrombosis of the cavernous sinus, the more usual complications developed but the process produced posterior cervical thrombophlebitis with abscess formation and late septicaemia, an unusual result. A continuous stream of pus ran from the abscess beneath the dura under the cavernous sinus and over the sphenoid body down along the right jugular bulb and then posteriorly in the neck and connected with diffuse bilateral posterior deep cervical abscesses. This condition with the anterior cervical spaces free from infection is unique. The perfectly healed right mastoid wound and dry cavity of the middle ear in association with the pain, nasal obstruction and sinus infection on the left side during the earlier stages presented a confusing syndrome. The development of recurrent asthma with the onset of infection of the sphenoid suggested that previous disease of the sphenoid may have escaped notice and reactivation due to the lowering of the patient's resistance by the mastoid infection may have caused the unusual symptoms and overwhelming infection which followed.

Osteomyelitis of the sphenoid bone will not respond to drainage by steel drills. It requires extensive surgical removal of the bone beyond the infected thrombosed blood vessels as in osteo-

myelitis in other locations. This is not possible by any known technique. JAMES C BRASWELL, MD

### NOSE AND SINUSES

Larsell, O. and Fenton, R. A. Lymphatic Pathways from the Nose. Research Report. *Arch Otolaryngol*, 1936, 24: 696

The authors state that there are 4 routes by which material in solution or suspension can reach the bronchial and mediastinal lymph nodes from the region of the paranasal sinuses: (1) the trachea, (2) the combined path of the lymph nodes, tracheal lymph duct and blood vessels through the right side of the heart and the pulmonary bed, (3) the blood vessels, and (4) the lymph spaces and channels in the visceral cervical space, the dorsal wall of the esophagus, the prevertebral fascia, and related structures which communicate with the anterior part of the mediastinum.

The tracheal route is obvious. It is particularly important in air borne infection. The experiments with trypan blue clearly indicate that drippings from the posterior pharyngeal wall and the nasopharynx reach the lungs. The particulate matter, phagocytosed by septum and dust cells, is in part eliminated through the bronchial passages, but most of the phagocytic cells get into the perivascular, peribronchial and pleural lymphatics, and thence into the bronchial and neighboring lymph nodes. Lymph follicles in the bronchial walls within the lung become enlarged and, when bacterial invasion takes place, no doubt become infected.

Colloid material reaching the lungs by the combined lymphatic and blood routes diffuses through the capillary walls to be phagocytosed by the same type of cells that serve for the tracheal route, namely, septal cells and the so called dust cells. The pathway of these cells from the lungs is again through the various lymphatic channels of the lungs to the bronchial and mediastinal lymph nodes. When particulate material of larger than colloidal size enters the pulmonary bed, capillary plugs are formed and phagocytosis takes place. The phagocytes so involved can escape from the lungs only by the lymphatic channels already named. Bacterial invasion undoubtedly produces capillary plugs, which in turn become centers of proliferation and of long continued phagocytic activity, with long continued irritation to the lymphoid tissue and the neighboring structures.

The blood vessel route of invasion from the region of the sinuses is possible, but appears unlikely. Aside from the mediation of lymph nodes and lymphatic vessels, the pathways would be the same as when the lymphatic route is involved. The pulmonary lymphatic pathways and cellular elements would, of course, also be the same.

The fourth route mentioned, namely, the lymph spaces and channels in the neck which communicate with the mediastinum is probably of little importance. Bacteria escaping from the retropharyngeal

region into adjacent tissue spaces are probably phagocytosed by the numerous histiocytes in the looser tissues before they have gone far. The continuous communication of tissue spaces in the connective tissues from the neck to the thoracic wall and mediastinum, however, indicates the possibility of this pathway.

The combined lymph and blood route and the tracheal route were by far the most important paths by which material from the sinuses entered the lungs and the related lymph nodes in the experiments reported. The evidence did not permit definite conclusions as to which of these 2 routes was the more important, but it appeared to point toward the former. JAMES C BRASWELL, MD

Goldsmith, P. G. and Ireland, P. E. Mixed Tumors in the Nose and Throat. *Ann Otol, Rhinol & Laryngol*, 1936, 45: 940

The authors state that 6 cases of aberrant mixed tumors of the salivary gland type have been reported.

The general consensus is that these tumors are not true teratomas. Those closely associated with the glands proper probably arise from the gland ducts, and those of the aberrant type from embryonal rests. Cartilage and mesodermal tissue can be developed by metaplasia, a mesodermal origin is not considered essential.

Tumors of this type involving the accessory sinuses are rare. One such case has been reported.

In the reviewed cases the most satisfactory treatment was complete surgical removal.

Irradiation as primary treatment should not be considered, but prophylactic postoperative irradiation may have some value. Recurrence of the growth is frequent. JAMES C BRASWELL, MD

### MOUTH

Kronfeld, R. A Case of Tooth Fracture with Special Emphasis on Tissue Repair and Adaptation Following Traumatic Injury. *J Dental Res*, 1936, 15: 429

The author made a histological examination of a fractured root of an upper central incisor, studying his material in orderly serial sections. He found that definite tissue repair had taken place and that the pulp had remained vital during the uncertain number of years the tooth had been retained after fracture. A large amount of secondary dentine had been formed in the pulp chamber. Cementum had covered the fractured dentinal surfaces, but no solid union between the fragments occurred. In the space between the fragments a fibrous connection closely resembling the periodontal membrane had developed. The periodontal membrane in the apical fragment was found to be thin and atrophic, while that of the incisal fragment was thick and fibrous. His findings show that there had been a response to the functional requirements.

CHARLES W. FREEMAN, D.D.S.



Howarth W. Some Tumors and Ulcers of the Palate and Fauces. *J Laryngol & Otol* 1937, 52 1

Palatal tumors are not so uncommon as is often supposed and it is surprising what a large variety may be found. Professor Cohnheim as early as 1877 presented the theory that the main source of tumors is superfluous fetal tissue or fetal tissue which has been arrested in its development, has never reached maturity and remained quiescent in the midst of better developed tissues. This theory, though a comprehensive one is not presented to the exclusion of all other theories, but it is safe to say that there is no part of the body which suffers more from arrest and perversion of development than the palate.

The origin of mixed tumors in the parotid gland as well as in the palate (for they present the same clinical and histological characteristics) has given rise to considerable controversy. Of late years the majority believe that they arise from fully developed glandular tissue and that they are epithelial in origin. These tumors in the large majority of cases, are very slow growing and it is not uncommon for them to be present for many years before they are discovered. Attention is often drawn to them on account of some mechanical discomfort. They are usually encapsulated and are generally regarded as comparatively benign in character. However this is not always true. In the large majority of cases the surgical treatment is simple as the tumors shell out readily, and if the entire capsule is removed cure is usually effected.

Hemangioma and hemangiofibroma are rare tumors of the palate, but it is advisable that the possibility of their existence be considered in the differential diagnosis. Such a tumor may be mistaken for a peritonsillar abscess and incision may be fatal on account of hemorrhage.

Fatty tumors in the palate are extremely rare.

An unusual tumor is adenocarcinoma. Finder in an exhaustive study of the literature found only 6 recorded cases.

Osteomas are occasionally reported as occurring in the palate and Horsley has given a very good account of a case with an illustration. A mistaken diagnosis of osteoma may be made in the condition known as torus palatinus. Torus palatinus usually presents a symmetrical smooth swelling in the midline of the hard palate. It is an anatomical variation and not a pathological condition.

In malignant diseases particularly carcinoma there is usually an ulcerating tumor or a raised plaque with a varying amount of infiltration of the surrounding structures but there is a type of epithelioma with very diffuse shallow ulceration, a serpiginous outline and little or no infiltration at the edge.

Sixty-one cases of malignant disease of the palate and fauces are presented. After treatment 22 patients (36 per cent) died within the first year, 24 (39.3 per cent) died in from one to five years and

15 (24.5 per cent) survived for more than five years.

Syphilis in the palate and fauces manifests itself in the same protean manner of syphilis elsewhere, and the lesions may resemble those caused by other agents.

Tuberculosis of the fauces is seen almost invariably in patients who are in the last stages of pulmonary tuberculosis, is agonizingly painful, and rapidly progressive. The more chronic form of tuberculosis that is called lupus produces many cases of shallow ulceration in the fauces and usually responds to treatment satisfactorily. However there are intermediate forms which for want of a better term, are called "lupoid." These often resist treatment and show a tendency to relapse.

Streptococcal infections may be very chronic and resistant to treatment.

Another form of ulceration of the palate and fauces is precancerous epitheliomatosis. This is very chronic and twenty years may elapse before malignant degeneration occurs.

The author presents a detailed discussion of certain cases and describes the operative treatment which in most cases was carried out with the diathermy knife. Each condition presented is well illustrated with colored plates and photomicrographs.

LOUIS T. BURN, M.D.

## NECK

Blegvad N. R., Burrell L. S. T., Thomson Sir S. C. Ormerod F. C. and Horne J. A. Discussion on the Problem of Early Laryngeal Tuberculosis. *Proc Roy Soc Med Lond*, 1937 30 221.

BLEGVAD treats laryngeal tuberculosis by the method inaugurated by the Finsen Institute namely, by universal carbon arc light baths. In the last few years he has moreover used quartz light baths extensively. When the patient is febrile and has a bad constitution the quartz light bath is preferred as it is not so violent a treatment as the carbon arc light bath which often tires him very much.

The second part of the treatment consists in surgical procedures, which are always performed under the direction of the laryngeal mirror. This method is less strenuous for the patient and safer than operation by the direct method. It is safer to operate indirectly, because during a direct laryngoscopy the larynx is drawn out of shape and localization may be difficult.

Every treatment is begun with light baths and orders to keep silent, but unfortunately it is impossible to carry out these orders in a large hospital. If there is no appreciable improvement within a few months, a local operation is undertaken, but of course, only if the condition of the patient does not contra-indicate surgical treatment. Blegvad does not go into further details of the different operations but gives the following figures in the years from 1922 to 1936 there were performed 401 excisions, 527 galvanocauterizations, 40 amputations of the epiglottis.

glottis, 127 injections of alcohol, and 49 resections of the superior laryngeal nerve.

BURRELL found that one third of the patients sent to the throat department for examination on account of hoarseness or difficulty in speaking were sent back again as not being tuberculous. These patients always make a good recovery. On that account it has seemed to him that the tuberculous patient suffers from hoarseness or even loss of voice because of some change which is not necessarily tuberculous. When these patients were followed up in order to see whether they developed tuberculous laryngitis at a later stage, no greater incidence of tuberculous laryngitis was found in those who had had preliminary hoarseness.

Burrell found that a tuberculous larynx responds very well to artificial pneumothorax. It will also respond to other collapse methods, such as thoracoplasty, but pneumothorax is usually induced in cases of laryngitis. He has frequently been asked to induce pneumothorax on account of laryngitis on both sides. Ordinarily pneumothorax would not have been attempted but he was so impressed by the results of even partial collapse that now, when he finds a patient with any degree of tuberculous laryngitis, he attempts to induce artificial pneumothorax unless there is a definite contra indication. In cases in which it is possible to produce complete collapse of the lung it is exceptional for the tuberculous larynx to continue. When the condition of the larynx continues to become worse in spite of the medical treatment of the chest, the outlook is practically hopeless. If the condition improves there is a good chance that the patient will recover.

Burrell finds that not only such a complication as laryngitis, but also enteritis, becomes less severe when the lung has been collapsed. Therefore, if it is possible to improve the primary condition in the lungs, it is reasonable to expect improvement elsewhere also. One patient with laryngitis and diarrhea, the latter condition supposed to be due to tuberculous enteritis, was considered quite unsuitable for the induction of pneumothorax. However, pneumothorax occurred spontaneously, and recovery of both the larynx and intestine followed.

THOMSON The appearance of a larynx changes to some extent from day to day and under varying conditions, such as recent cough, pyrexia, or fatigue. Therefore it is important to obtain a good view of the interarytenoid region, the area most frequently invaded by tuberculosis. Inspection after a period of silence will help define a lesion.

Any one-sided congestion should arouse suspicion, as well as any irregularity. A second separate focus

also requires attention. A malignant growth spreads only from one center. Tuberculosis often simulates pachydermia, particularly in elderly patients. The "pachydermia" of forty years ago is now seen more rarely, as its true nature is more frequently recognized in many cases. We are apt to forget that tuberculosis is far from being rare in the old. There is a larger proportion of cases of tuberculosis among people between sixty and seventy-five years of age, than among people between twenty and thirty years of age. Of course, as the young people are more numerous, they present a far larger number of deaths. The young also die more quickly.

Tuberculosis of the larynx is still a very serious disease. It is noteworthy that of about 500 patients with this condition which were seen during a period of ten years, no less than 70 per cent were dead within three years of their leaving the institution. Therefore, nearly 3 of every 4 patients observed, are still doomed to death.

ORMERON The essential treatment of tuberculous disease of the larynx largely devolves on the physician, but the patient must remain silent and receive applications of the galvanocautery if possible. The physician and the thoracic surgeon, by means of various methods of collapse therapy, take an important part in the treatment of tuberculous laryngitis.

HORNE speaking of his own clinical and pathological researches, said that the earliest clinical evidence of laryngeal tuberculosis was not hoarseness but dysphonia or transient aphonia. The earliest change in the larynx was not an acute condition, but was shown by pallor and impaired adduction of the vocal cords, which left at times a triangular opening at the posterior third of the glottis and caused phonatory waste.

The possibility of pulmonary tuberculosis must always be kept in mind in all cases of aphonia whether intermittent or persistent, and more particularly in women. It must not be labeled "functional aphonia" or "hystenia" and treated accordingly.

Horne found that when the larynx was infected with tuberculosis the disease was already established in the lung. Primary tuberculosis of the larynx was negligible. The disease in the larynx progressed *pari passu* with that in the lungs when the disease in the larynx presented ulceration, that in the lungs had advanced to cavitation and when that in the lungs had become arrested, that in the larynx had healed. When the disease in the lungs was confined to the pure milky form the larynx was not infected.

JOHN J. MALONEY, M.D.

# SURGERY OF THE NERVOUS SYSTEM

## BRAIN AND ITS COVERINGS CRANIAL NERVES

Hartmann F. Circulatory Conditions and the Circulation of the Artificially Perfused Brain Under Increased Intracranial Pressure (Kreislaufverhältnisse und Durchblutung des künstlich durchströmten Gehirns bei erhöhter Spannung in der Schädeldhöhle) *Deutsche Zeitschr f Chir* 1936 247 242

The Starling heart and lung preparation is singularly adapted for the purpose of artificially perfusing other organs and at the same time to give insight into the circulatory requirements of these organs. The author used this preparation for the purpose of perfusing the isolated brain of a dog. The procedure is not very simple and requires a great deal of experimental skill. The artificially perfused brain remains in nerve connection only with its body and can therefore exert influence upon the blood pressure and respiration of the experimental organism without being influenced by the secondarily occurring circulatory changes in the body. The value of these experiments is shown by the logical refutation of Cushing's theory of the development of cerebral pressure. Cushing attributed the cerebral pressure to an anemia of the cerebral vessels. He regarded the large wave like fluctuations of the general blood pressure associated with high cerebral pressure as a purposeful regulating mechanism. He says that this fluctuation is caused by the alternate stimulation of anemia from the rising blood pressure and its disappearance following the improved cerebral circulation from the increased blood pressure with its subsequent renewed vascular compression. If this theory were correct then the blood pressure fluctuations in increased cerebral pressure should have disappeared completely in the experiments of the author as in the isolated perfusion of the brain the secondary effects of the general blood pressure upon the cerebral circulation were completely absent. However this was not the case. The wave like fluctuations could be observed even better in the author's experiments than in Cushing's experiments. Cushing's theory is therefore untenable. We are more likely dealing with a primarily elicited reflex caused by direct pressure acting upon the nerve substance probably the medulla oblongata.

Concerning the relationship between the cerebral circulation and the cerebral pressure interesting experiments are reviewed. In addition to the respiration the general and the perfusion blood pressure and the cerebral pressure on the convex surface which can be elevated at will by means of a Ringer solution pressure system are shown. The suboccipital cerebrospinal fluid pressure is also given. When the intracranial pressure is uniformly in-

creased at regular intervals the perfusion volume of the brain shows an increase of from 80 to 100 per cent after an initial decrease. The perfusion increases in spite of uniformly maintained high cerebral pressure disproves the anemia theory of pressure symptoms. The reflex dilatation which guarantees the safety of the cerebral circulation occurs for the most part because of compression of the middle meningeal artery. This was ascertained by M and D Schneider in experiments pertaining to the receptor fields of this vessel. For this reason a favorable influence upon the cerebral circulation can be expected from decompression trephination in the subtemporal region during surgical treatment of cerebral pressure.

(DIETRICH SCHNEIDER) HARRY A. SALEMAN, M.D.

Morsier G. de Nervous and Mental Disturbances Following Injuries of the Brain and Skull (Les troubles nerveux et mentaux consécutifs aux traumatismes crâniocérébraux) *Rev méd de la Suisse Rom* 1936 56 783

There has been a great change in recent years in the conception of nervous and mental disturbances following injuries of the head. Formerly, if there were no gross lesions the unfortunate sufferers were assumed to be malingerers if they did not return to work promptly or if they demanded compensation for symptoms that were thought to be purely subjective. Now it is known that they may receive a serious injury which is not visible externally and instead of being condemned they should be examined and treated very carefully. The author describes the various symptoms that may occur: headache, dizziness and disturbances of equilibrium, disturbances of memory, changes in character, ready fatigue, disturbances of sleep, sympathetic disturbances, disturbances of the sympathetic nervous system, genital symptoms, visual anomalies, auditory symptoms, speech disturbances, disturbances of smell and taste, sensory and motor disturbances and epileptiform attacks.

Clinical examination should be supplemented by lumbar puncture and encephalography. The lesions which may be found are described and illustrated in the original article.

The barbiturates are the best symptomatic remedies. Patients suffering from traumatic encephalopathy should be treated somewhat like patients with migraine. Transcerebral ionization has given good results in some cases. Warburg recommends roentgen therapy but the author believes that surgery is of increasing importance. Instead of urging these patients to get up and go to work as soon as possible they should be kept in bed for a long time. Patients who have shown signs of cerebral concussion should be kept in bed for at least four weeks. After leaving the hospital they

should remain convalescents for an equal length of time. They should never be allowed to go to work immediately after leaving the hospital. Patients who have had an injury of the brain should be kept under observation in the hospital and should be examined by the neurologist, the ophthalmologist, the otologist, the roentgenologist and the neurological surgeon.

In the discussion 2 physicians agreed with Morsier's views, and 2 others were of the opinion that many of these patients merely had traumatic neuroses and too much attention to their ills exaggerated rather than remedied them. Morsier called attention to the fact that the last 2 physicians were associated with the National Insurance Societies, and that their opinions, as well as the opinions of their patients, might be influenced by other than purely medical factors.

AUDREY GOSS MORGAN, M.D.

Dial D. L. and Maurer G. B. Intracranial Aneurysms. *Am J Surg* 1937, 35, 2.

The clinical symptoms and post mortem findings in 13 cases of intracranial aneurysm are given in detail with particular reference to the medicolegal aspects. The 13 cases were noted in 2,850 autopsies in which the brain was examined. The cases are divided into 5 groups, based on the causes of the condition. Arteriosclerotic change was the probable cause in several cases, and marked hypertension with slight atheromatous change in the cerebral vessels, in 2 cases. In these 2 cases an aneurysm occurred in the bifurcation of the vessels forming the circle of Willis, a site of possible natural weakness. Syphilis was found to be a rather unimportant cause, present only in 2 cases, and these were the only 2 cases in which multiple aneurysms were found. One case suggested trauma or congenital origin as the basis for the aneurysm, and in the other no cause could be determined. Two of the 13 patients died suddenly, while the remainder lived from one to twenty nine days. Headache or migraine was common but probably of no prognostic value. The onset of symptoms in several cases was very sudden, 4 of the patients complaining of sudden stabbing pain over one eye.

The spinal fluid was not examined in 3 of the cases in 7 it contained blood. In the remaining 3 cases in which the aneurysm had not ruptured the spinal fluid failed to show blood. There was an erosion of the lower esophagus with escape of the gastric contents into the pleural cavity in 2 cases. Examination in 1 case showed hemorrhages in the tuberoses and other nuclei of the hypothalamus associated with intraventricular hemorrhage. The other case was seen in 1919, but the material was not available to enable a study of the hypothalamic region.

The authors conclude that rupture of an intracranial aneurysm must be considered in cases in which sudden death occurs.

ROBERT ZOLLINGER, M.D.

Vincent G. David, M., and Askenasy, H. A Method of Treatment of Subacute and Chronic Abscesses of the Cerebral Hemispheres (Sur une méthode de traitement des abcès sous-jaugés et chroniques des hémisphères cérébraux). *J de chir*, 1937, 49, 1.

The authors discuss the treatment of intraparenchymatous abscesses of the hemispheres which do not communicate with the ventricles or the arachnoid cavities. The abscesses may be adjacent to these cavities. They may be acute, subacute, or chronic from the beginning. In the acute forms there is no pus but a massive edema, and the patient is not suffering from suppuration but from toxic infection. In the subacute and chronic forms pus has formed and must be removed.

It has been the custom heretofore to treat these abscesses by repeated puncture and drainage. This treatment is effective only in cases of small abscesses near the surface without any tendency toward extension. Even in these cases there are many failures, and the treatment does not succeed at all in cases of large deep abscesses. The authors describe their method of removing the abscess *en masse*—wall and contents—and suturing the dura mater without drainage. If the abscess is subacute and the patient's condition does not permit this operation, and if the thickness and resistance of the wall of the abscess are not sufficient to make it practicable, decompression is effected by means of a large flap without puncture of the dura mater and without drainage. Then when the opportune moment arrives the abscess is removed *en masse* without drainage.

The authors report 5 cases which they have operated on, 3 by decompression followed by removal *en masse* at a later date and 2 by removal *en masse* at once. Illustrations accompany the reports. The result in all of the cases was a rapid and apparently permanent cure.

AUDREY GOSS MORGAN, M.D.

Kahn, E. A. The Treatment of Encapsulated Brain Abscess. *J Am M Ass*, 1937, 108, 87.

The treatment described by King in 1924 consists in direct transcortical exposure of an encapsulated abscess, uncapping the presenting wall, and packing the cavity in 1 operation. A modification of the technique making a trephine opening over the suspected area is presented. This procedure allows the abscess to migrate to the surface. Increased intracranial pressure causes a slight herniation of the brain at this site. The surface vessels are coagulated and the arachnoid is sealed to the cortex at the margins of the wound. An iodoform pack promotes the formation of adhesions.

After three or four days the second stage of the operation is performed or, if necessary, it may be postponed for several more days. The abscess capsule, if smooth walled and not adherent, migrates to the surface covered by edematous brain.

The edematous brain is easily removed by suction, and the abscess is then drained. Nitrous oxide is

used as the anesthetic for the second stage, because of its tendency to increase the intracranial pressure. The abscess may be excised if feasible.

The most important factor in the postoperative treatment is the prevention of brain herniation by lumbar puncture and dehydration. These 2 procedures readily controlled the cerebrospinal fluid leakage which occurred in 2 of the 4 cases presented.

Before surgical treatment of the abscess was attempted the source of the infection should be removed.

FORWARD S. PLATT, M.D.

### PERIPHERAL NERVES

Chiodi V. The Evolution of the Biological Characteristics of Malignancy in Tumors Arising from the Cells of Schwann (*Evoluzione dei caratteri biologici di malignità nei tumori originati dalla cellula di Schwann*). *Tumors* 1936 22 485

Chiodi gives a comprehensive autopsy and histological report of a metastasizing neurinoma in a woman forty-two years old. The only symptoms noted were a rapid cachexia and a large abdominal tumor. The primary growth was in the right lung and there were metastases in the liver, pancreas and right kidney.

The tumor was composed of long delicate retractile fibers with a faint longitudinal striation and a whorled or fan-shaped arrangement. The nuclei were polymorphic and occasionally formed palisades. The structure was homogeneous; nerve fibers were absent, and connective tissue was very scarce. The relationship of the tumor to the pleura and the bile and pancreatic ducts was peculiar. It crept along the visceral pleura without perforating it and formed in longitudinal fibers beneath the ducts of the liver and pancreas while destroying the deeper tissues. In other words, it showed a tendency to develop in the depths and interstices of tissues a

characteristic which is perhaps attributable to the nature and mode of growth of the Schwann cells.

The exclusively visceral metastases and the absence of infiltration of the lymph nodes suggest a mode of diffusion intimately connected with the nerve trunks, especially the visceral sympathetic trunk. The hypothetical route would be through the intrapulmonary rami to the thoracic sympathetic chain, and eventually to the celiac plexus and its branches. The thoracolumbar trunk showed no macroscopic changes but it was not examined microscopically.

The tumor described by the author was therefore a true neurinoma histologically and biologically malignant, although belonging to the fascicular type. Its malignancy was presumably not preceded by a benign phase and not stimulated by operative procedures.

The author reviews 23 reported cases of malignant neurinoma. This list is incomplete but it includes the most important and most fully described cases. Geschickter's cases are excluded because he is uncertain as to their classification. Only 4 of the reported cases present an exclusively neurinomatous structure and complete malignancy (metastasis and destructive growth): 1 of Pazzaghi's (1930), 1 of Denecke's (1932), and 1 of Fittipaldi's (1932). The author's case is the second absolutely malignant neurinoma of the fascicular type.

Chiodi gives an introductory discussion of the classification, morphology, and histogenesis of neurinomas and related tumors and the criteria of malignancy. He contrasts the precise and unambiguous conceptions of neurinoma held in Europe with the diverse and variously modified interpretations and classifications made in America. All of them, however, agree on the neurinoma in substance.

The article is accompanied by a bibliography and microphotographs.

M. E. MORSE, M.D.

# SURGERY OF THE THORAX

## CHEST WALL AND BREAST

Pissareva T and Deinika, I. The Effect of Oophorectomy on Inoperable Cancer of the Mammary Gland (Influence de l'ovariectomie sur le cancer inoperable de la glande mammaire) *Eksperimental med* 1936, No 1, p 38

The operation of oophorectomy for inoperable cancer of the mammary gland was proposed in 1889 by Schinzinger for the purpose of bringing about atrophy of the tissues of the gland and, therefore, retrogression of the tumor. The French and English literature particularly, testifies to the success of this operation, which is followed by improvement in the general condition and decrease in size, or even disappearance, of the tumor. In 1905 Lett reported improvement in 29.3 per cent of 99 cases in which oophorectomy was performed. Loeb, Kori, and Murray have shown that the ovarian hormone plays a part in stimulating the production of spontaneous cancer in the mammary gland of the white mouse, but they did not find that it had any effect on an already existing cancer. Such an effect has not yet been ascertained and further study must be made.

Prof Melnikov of the Radio Oncological Institute of the Ukraine has been performing oophorectomy on patients in a desperate condition with the fourth stage of mammary cancer since 1932. He has performed 39 of these operations. The author discusses 31 cases operated on from 1934 to 1935. In 24 the women were still menstruating and in this group the largest proportion of success was obtained. On 3 women more than fifty years of age the operation had practically no effect. These results agree with those of Lett and Michel.

In all the cases the patients presented numerous metastases in the axillary and subclavicular glands and often in the cervical glands. In 7 cases there were metastases in the skin, in 9, in the lung, in 9, in the bones, and in 9, in the opposite mammary gland. In 17 cases the oophorectomy was performed on account of an inoperable recurrence following soon after the first operation, which progressed rapidly and seriously aggravated the prognosis. The cancer in 1 of these cases became operable. Of 13 cases treated by oophorectomy for inoperable cancer of the mammary gland 5 became operable within from ten to forty five days after the oophorectomy and amputation was performed later. In 1 case oophorectomy was performed on account of metastasis in the other mammary gland.

In 6 cases histological examination showed ovarian metastases which had not become manifest clinically and were found only on gynecological examination. An observation period of from two to seven months showed that the oophorectomy did not have any effect on the metastases in the lymphatic

glands, the skin, the bones, or the viscera. However, the metastases in the lymphatic glands, the skin, and the bones yielded to radiotherapy, and for this reason they are not a contra indication to oophorectomy. Metastases in the viscera (the lungs in this case) are not affected by oophorectomy and are not accessible to radio therapy.

Subjective improvement in the form of a decrease or disappearance of the pain, an increase in strength, and an improved general condition of the patient was seen in 25 cases. In 22, it persisted throughout the period of observation. Objective improvement in the form of decreased size of the tumor (complete disappearance in 1 case), increased mobility, and decreased fetid discharge and edema of the arm was seen in 22 cases. It persisted in 17 throughout the period of observation. Three patients died a few months after the oophorectomy, 2 of the cancer and a third of gas phlegmon which had developed after excision of the tumor.

Two advantages of oophorectomy in these cases were the possibility of changing an inoperable cancer into an operable one, and of removing metastatic foci with the ovaries.

This operation does not save the life of the patient but, combined with radiotherapy, it is a last resort for relieving the suffering and prolonging life, often for several years. AUDREY GOSS MORGAN, M D

## TRACHEA, LUNGS, AND PLEURA

Cutler, E. C. and Gross, R. E. Non Tuberculous Abscess of the Lung. *J Thoracic Surg*, 1936, 6 125

To prevent the development of pulmonary abscess after surgical operations it is necessary to recognize the various factors which may be important in causing the condition. In order to reduce the hazard of pulmonary infarction by embolism operative manipulation must be gentle and mass ligatures avoided. Adequate oral hygiene should be instituted before the operation whether it is to be done under novocain or general anesthesia, in order that the danger of infecting the bronchial tree will be reduced to the minimum. In the presence of postoperative bronchopneumonia, secondary infection of the lung tissue should be guarded against by proper cleansing of the teeth, gums, and pharynx. To prevent the development of abscess in patients who have not been subjected to surgical procedures, special attention should be directed toward the prevention of superimposed invasion by the anaerobic "mouth organisms" in all cases of pulmonary disease.

In all cases of pulmonary abscess medical treatment with postural drainage and supportive measures should be continued for a period of at least six weeks. If progress in the draining and healing of

the cavity is not evident during that time, operative drainage should be instituted. In a follow up of 39 patients after medical treatment it was found that 68 had satisfactory results and 29 per cent had died. The use of arspenamine or neo arspenamine appeared to be of little value in cases in which spirochetes were present in the sputum.

The use of artificial pneumothorax for collapsing a pulmonary abscess should be discouraged as it often has little curative value and it is dangerous because it may induce empyema or pyopneumothorax.

Of 47 cases of abscess treated surgically satisfactory results were obtained in 47 per cent and death resulted in 43 per cent. If the cases with a complicating empyema or pyopneumothorax are excluded the mortality was 33 per cent.

Of 33 cases in which attempts were made to drain the abscess surgically it was possible to perform a 1 stage operation in 26. In the remaining 7 cases the pleural surfaces were not adherent and a 2 stage operation was necessary.

Thoracoplasty has little place in the treatment of pulmonary abscess unless this procedure is to be combined with cauter pneumonectomy.

Patients treated for pulmonary abscess must be followed for several years before they can be assured that complete cure has been effected. During this interval they should be held to a hygienic regime similar to that prescribed for patients with pulmonary tuberculosis. J DANIEL WILLEMS MD

King J C and Harris L C Jr Congenital Lung Cyst. *J Am M Ass* 1933, 103, 274.

The authors define a congenital cyst of the lung as an intrapulmonary sac of fluid the wall of which is composed of bronchial tissue and the fluid content of products of the bronchial epithelium. Only 108 cases were collected from the literature up to 1925. All of the patients succumbed. In the past ten years 152 such cases have been reported. The authors report a new one which was diagnosed with the aid of roentgenology. A follow up report of a case reported by Crosswell and King is given also.

The new case was that of a colored child eight months of age whose life up to the age of eight months was normal. She then developed a nasal discharge and a cough. Mucoid material was coughed up. Bilateral otitis media developed and the ear drums were punctured. X ray examination of the chest revealed an area of opacity 1 by 1½ in the upper part of the lower lobe of the right lung. Evidence of consolidation of the right side of the chest appeared. A bilateral mastoidectomy was done. One month after the first roentgen examination of the chest a second examination revealed a multilocular air sac replacing the area of previous cloudiness and also involving lung tissue of the right middle and lower lobes. The diaphragm was displaced downward and the heart to the left. There was an increase of pressure within the cystic sac during inspiration. A diagnosis of congenital lung

cyst was made. The child died but autopsy was refused.

The follow up report pertains to a white boy in whose case a diagnosis of congenital lung cyst was made. The cyst was injected with iodized oil and spontaneous recovery occurred. Four years later he was examined again and a small amount of iodized oil was found in the chest but there was no other evidence of the original cyst.

The authors agree that lung cysts are congenital in origin. They are of the opinion that an unknown process interferes with the canalization of a bronchial anlage at some point proximal to the termination of that ramification. This results in the occlusion of the radicle and a portion persists as a mass of cells. Canalization begins again distal to the occlusion and produces an isolated canalized segment with normal mucous membrane. The mucous membrane assumes its normal secretory function thus giving rise to a cyst. The cyst may subsequently rupture into a bronchus or it may remain a fluid sac without bronchial communication however rupture into a bronchus is most frequent. When a cyst communicates with a bronchus an expansile balloon cyst is formed if there is a formation of a check valve. A non-expansile air cyst results from the formation of a bypass valve at the opening in the bronchus. If the communication is large and free spontaneous cure occurs. All fluid cysts will stop the valve action of the communication with the bronchus.

There is no characteristic symptom or train of symptoms of lung cysts. Many such cysts are symptom free. The usual history reveals recurring attacks of respiratory infections and finally dyspnea and cyanosis. The dyspnea is persistent but the cyanosis is intermittent. The diagnosis rests on a careful roentgenological examination demonstrating single or multiple sharply defined intrapulmonary shadows with the density of either fluid or air or both with a fluid line.

The prognosis is unfavorable in infants. Of 46 patients under three years of age whose cases were reported 36 are dead. Seven of the remaining 10 were cured. Fluid cysts become serious only when they become infected. Their treatment is chiefly surgical. If they are diagnosed in infancy surgery should be deferred until the patient reaches an age when surgery may be more safely undertaken. Thoracentesis may serve until more radical measures can be applied. It is the opinion of the authors that single aspirations are of no value and may be harmful. FARR O LATIMER MD

Sergeant Kourilsky Turiat and Pauchard Primary Suppurative Cancer of the Lungs (Les cancers primitifs suppurés du poulmon). *Pres Méd* Par 1935 No 92 1793.

The authors describe 2 types of primary cancer of the lungs which becomes suppurative. One is the necrotizing cancer which at first is circumscribed in the lung parenchyma. This type is manifested in

the roentgenogram by a well defined round shadow in one of the pulmonary fields. The growth becomes necrotic because of various factors that are not well understood, and the fragments tend to pass into the bronchi. When this occurs, secondary infection and suppuration are inevitable. After the growth becomes necrotic the roentgenogram shows a cavity, often with a fluid level. Careful histological examination of the sputum may disclose the presence of cancer cells. The authors have found that, with a suitable technique, cancer cells may be demonstrated in the sputum at an early stage. It is in this type of cancer that lobectomy is indicated if it can be done at a sufficiently early stage before necrosis and suppuration have caused much destruction of tissue and extension of the lesion. The authors report 2 cases in neither of which lobectomy was attempted. In 1 of them the growth was destroyed with the cautery. This treatment was followed by marked improvement for several months, but recurrence developed and death resulted.

The other type of primary cancer of the lung which becomes suppurative is associated with bronchial obstruction. The obstruction may be due to compression of the bronchus by a growth in the adjacent parenchyma or the bronchus may be the site of origin of the growth which later invades the parenchyma. Histological studies have shown the latter condition to be the more frequent. In either case infection and suppuration result and extend into the parenchyma around the bronchus. In some cases the suppuration develops in the interior of the lobe invaded by the growth, with the formation, in some instances of multiple small abscesses. Sometimes, when a large bronchus is obstructed by the cancer there is an atelectasis involving the lobe more or less completely with suppuration in either the collapsed portion of the lung or adjacent areas. In rare cases the compression of the bronchus results in a chronic bronchopneumonia terminating in bronchiectasis. In such cases the roentgen findings are more difficult to interpret than in cases of the first type. The opaque shadow of the cancer mass is not clearly defined. It is often situated in the region of the hilus and is surrounded by an opacity which is more or less diffuse depending upon the degree of the associated atelectasis. The stenosis of the bronchus can be demonstrated only by examination with lipiodol. The abscesses, usually multiple, are often not visible. The authors report 3 cases of this type. In 2 the cancer originated in the bronchus, and in 1 it developed in the parenchyma and compressed a bronchus secondarily. In all 3 cases there was an associated atelectasis. ALICE M. MEYERS

Monod R, and Iselin, M. Indications for Operative Intervention in Cases of Acute Purulent Pleurisy (Les indications opératoires dans les pleurésies purulentes aiguës). *Ann. méd.-chir.*, Par. 1936, 1: 38.

According to Monod and Iselin the bacterial classification of the various types of acute purulent

pleurisy is of medical interest from a therapeutic as well as a prognostic point of view. All attempts to determine the various types of surgical intervention and their indications have led to numerous discussions and confusing conclusions.

The authors state that the surgical classification of purulent pleurisy is based in all cases upon the stage of its evolution. Usually it may be separated arbitrarily into 3 distinct stages: (1) the diffuse stage, (2) the stage of pus accumulation, and (3) the stage of cyst formation.

In the presence of diffuse pleurisy it is best not to interfere. It is advisable to follow the progress of the pleural effusion by roentgenological examination and repeated chest punctures. Early surgical intervention is useless and dangerous because the sudden evacuation of the pleural effusion may cause a decompression resulting in pulmonary edema and death. Also, the opening of the pleural cavity at this stage may cause pneumothorax with displacement of the mediastinum and resulting cardiac and circulatory disturbances.

Usually diffuse pleurisy develops into empyema in from four to twenty days, but in some persons the pleurisy remains diffuse. In the latter cases surgical interference is indicated in the presence of pulse irregularities and extrasystoles. It is important to remember that in these patients cyanosis definitely contra indicates surgery.

In performing thoracentesis (pleurotomy) the production of surgical pneumothorax may be prevented by using a small drain. The drain should be introduced under local anaesthesia with the aid of a special trocar connected to a siphon so that the pus can escape, but the air cannot enter into the pleural cavity.

In cases in which the pleural effusion takes a favorable course, the patient's temperature drops, his pulse becomes more quiet, his general condition improves, but he presents a marked pallor and his weight continues to drop. At this stage empyema has developed and on aspiration thick pus is obtained. X-ray examination shows a tendency of the effusion shadow to contract. At this stage prompt surgical intervention is imperative and the author has shown that the pleural cavity may be opened with impunity.

In cases of pleurisy with the formation of a pus pocket, the clinical signs are often confusing. The localization of the effusion is determined with difficulty, the pleura is thickened at a distance from the pocket, and the roentgenograms show shadows characteristic of pachypleuritis. Usually aspirations do not yield any clue, either because of the great density of the pus or the failure of the needle to strike the pus pocket.

In the presence of cysts, pleurisy should be treated like a pulmonary abscess with which it has clinically much in common. Pleurotomized cavities are usually obliterated with great difficulty.

The authors present finally a series of statistical data showing that surgical intervention performed



at the stage of diffuse pleurisy carries the greatest mortality, either because of faulty technique (production of a pneumothorax) or extension of the original lesion. Surgical intervention in the empyema stage usually yields the best results and has a very low mortality rate. RICHARD E. SODER, M.D.

### HEART AND PERICARDIUM

O Shaughnessy, L. *The Surgical Treatment of Cardiac Ischemia*. *Lancet* 1937 232 185

The author has previously demonstrated that greivounds with omental grafts to the pericardium following ligation of the descending branch of the left coronary artery chased the electric hare 525 yards without distress. Retrograde injection experiments demonstrated the existence of vascular connections between the omental graft and the heart of the animal.

The indications for cardio omentopexy are not yet rigidly defined. The author demands unequivocal evidence of cardiac ischemia. Also he must be satisfied that the immediate risks of such a procedure are less than those the patient must run if the disease pursued its natural course.

A general anesthetic under positive pressure is used. The chest is entered through an incision along the left fifth intercostal space extending from the anterior midline to the midaxillary line. The fifth and sixth costal cartilages are divided near the sternum and the ribs are spread by means of a mechanical retractor. This exposes the pericardium. The left phrenic nerve is located and crushed. The intrapulmonary pressure is then reduced and the table is tilted to the right exposing the left leaf of the diaphragm. Two stay sutures are placed in the diaphragm and the abdomen is opened. A suitable piece of omentum is secured and brought up into the chest. The diaphragm is then sutured about the omental pedicle and the table is brought back to its original position. The pericardium is incised and the omental graft sutured to the surface of the heart and to the edges of the pericardium. Sutures of fine linen thread are used. The chest wound is then closed, and returned to its normal condition.

The author reports on 6 patients who received this operative treatment. There were no immediate operative deaths. One patient died within a week from a bleeding duodenal ulcer. Another died three months later from uremia. The 4 other patients are living and present definite improvement in their condition. One patient is living five months after the operation. EARL O. LATIMER, M.D.

### ESOPHAGUS AND MEDIASTINUM

Lyall, A. *Chronic Peptic Ulcer of the Esophagus. A Report of 8 Cases*. *Brit J Surg* 1937 24 534

Eight cases of chronic simple ulceration of the esophagus were found in 1500 autopsies made at the Glasgow Royal Infirmary during the past four years. All cases of acute ulceration or ante mortem

digestion were excluded. The chronicity in these 8 cases was shown by a fibrous induration which extended outward from the ulcer and by an enlargement of the blood vessels. All of the patients had been over fifty years of age, the average age being sixty three and five tenths years. The ulcers had been unsuspected during life and some had probably been present for years so that the true age incidence was lower than the post mortem figure. Five of the patients were male and 3 female. In 4 of the patients ulceration was also present in the stomach or duodenum; the patients apparently having had the so called ulcer diathesis. Two of the patients had had no dyspeptic symptoms. In the other 6 the symptoms had been present for a variable time, probably for years. In 2 of these latter 6 the symptoms had most likely been due to a concomitant duodenal ulceration. In 3 of the patients the severe dyspeptic symptoms had undoubtedly been due to the esophageal ulceration. It was worth noting that in all of the cases the symptoms had been referred to the stomach and duodenum, not only by the patient but also by the physician, and that the esophagus had been suspected as the cause of the symptoms in only 1 of them at a late stage when fibrous stricture was taking place. In 4 of the 8 cases hematemesis had been present but it was marked in only 2. In 5 the esophageal ulceration had been considered at least an important factor in causing death. In 3 cases the immediate cause of death was lobar pneumonia but in both the ulcer was undoubtedly an exciting factor in the 1 death followed a very advanced inanition which had been produced in the patient and in the other it followed hematemesis from the ulcer. In 1 case the immediate cause of death was empyema and mediastinitis which had spread from the base of the ulcer. In another case death was the result of recurrent bleeding from the ulcer and in the last case death was due to erosion of the thoracic aorta by the ulcerative process. In all of the cases the ulcer was situated at the lower end of the esophagus and in many of them its lower edge was sharply limited by the cardiac sphincter.

There appear to be 2 different types of ulcer in this region. In the first type the ulcer is fairly superficial. It may remain shallow or it may become deeper at one place becoming as it were an ulcer within an ulcer. In 1 case it caused mediastinitis and empyema and in another it eroded the aorta. This type of ulcer involves the esophagus immediately above the cardiac sphincter. The lower edge is clean cut and unhealing in most cases whereas the upper edge is indefinite, often circinate and fades off to the intact mucous membrane.

In the second type the ulcer is localized deep and penetrating and has the typical appearance of a very chronic gastric or duodenal ulcer. The 2 types of ulcer are so different in their appearance that Lyall has been tempted to look for 2 different causes. The superficial type is believed to be secondary to digestion caused by hyperchlorhydria because the upper edge farthest away from the

gastric juice, shows more healing than the lower edge which is in close proximity to the gastric secretions. The lower edge, however, is usually sharp and clean cut, showing little healing as compared to the upper part.

The second type of ulcer may arise from heterotopic gastric mucosa found beside the ulcer. When these heterotopic patches are small and the amount of acid secreted correspondingly meager, the acid will be diluted rapidly by the saliva and cause no harm. However, if these heterotopic patches are more extensive and there is some degree of spasm in the cardiac sphincter, the accumulation of this acid secretion in the lower part of the esophagus will set up first an irritative, and later an ulcerative, condition. These lesions are therefore similar to the ulceration found in Meckel's diverticuli which occasionally contain heterotopic gastric mucosa.

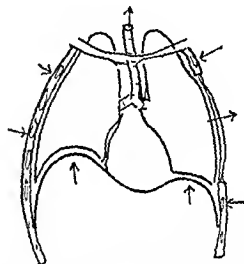
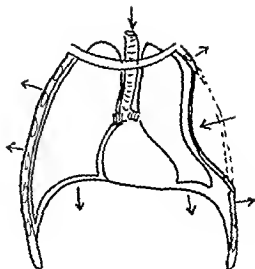
SAMUEL J. FOGELSON, M.D.

### MISCELLANEOUS

Killian, H. New Contributions to the Question of the Indications for the Method Called "Differential Pressure" in Thoracic Surgery (Nouvelles contributions à la question des indications de la méthode dite "dépression différentielle" dans la chirurgie thoracique) *Ann. et anal.* 1936, 2: 543.

Many surgeons have reported successful operations in the thoracic cavity without the use of positive pressure. Many operate routinely without it although most of them use anesthetic apparatus fitted with bags and valves which are partial aids in the prevention of collapse of the lung. Sauerbruch performed successful thoracic surgery first by the use of a negative pressure chamber and later by the use of positive pressure to inflate the lung. Positive pressure acts not only on the pulmonary aeration, but also on the pulmonary circulation and the mediastinum. Sauerbruch claimed that the thoracic wall, the diaphragm, and the mediastinum constitute a functional unit. The author states that the mediastinum may be compared to the oscillating membrane of a differential manometer. Changes in its structure, thickness, elasticity, and tension will alter its motions. On the basis of the findings of recent mediastinographic studies made by Rehn, Polano, and Pannewitz and those of cinematographic studies made by de Weth, Pannewitz, and Schneider, Killian has constructed a series of diagrams of the pressure relations in the thorax in the normal subject and in the presence of various pathological and mechanical changes. He presents such diagrams and a description of the movements of the diaphragm and mediastinum during inspiration and expiration.

In the normal subject with a closed thorax slight movements of the mediastinum may occur but are so minimal that they are inconsequential. Mediastinal rigidity may be due to inflammatory infiltration or the presence of a tumor. In the presence of a pathological process in the apex of one lung the medias-



Movements of the mediastinum in a case of thoracic plasty in the presence of a mobile mediastinum

tinum is pulled toward the affected side during inspiration and returns to its normal position during expiration.

During inspiration in simple unilateral pneumothorax the mediastinum is concave toward the affected side and pushed toward the normal side. In bilateral pneumothorax it behaves in general as in a healthy subject. In pneumothorax under positive pressure it is strongly dislocated toward the healthy side and the diminution in the capacity of the two lungs may exceed 50 per cent. The lung on the affected side is completely collapsed and the lung on the other side partially collapsed, the degree of collapse of the latter depending upon the degree of mobility of the mediastinum. In addition to the reduction of the alveolar capacity caused by the collapse alone there is a reduction of this capacity due to excessive filling of the pulmonary vessels with blood. The same phenomena occur in free open pneumothorax unless there is more or less rigidity of the mediastinum due to previous pathological

changes. In thoracoplasty there are similar movements depending upon whether the mediastinum is mobile or rigid.

Killian concludes from his study that in cases of closed thorax, positive pressure anesthesia leads to a ballooning of the alveoli, modifications of pressure within them, and obstruction to the flow of blood in the pulmonary circulation, whereas when the thorax is open such anesthesia helps to hold the mediastinum in the normal position, prevents collapse of the lung on the unopened side, prevents more than partial collapse on the open side, and allows a free flow of blood in the pulmonary circulation. Therefore, unless it is possible to demonstrate that the mediastinum is rigid before operation, it is advisable always to make use of minimal positive pressure for operations opening the thoracic cavity.

MAX M ZIVINGER M D

Santoro M. Diaphragmatic Hernia of the Esophageal Hiatus (*Lernia diaframmatica dello hiatus esofageo*) *Arch Ital d mal dell appar digerente* 1936 5 455

After having reviewed the literature on diaphragmatic hernia of the esophageal hiatus, Santoro reports 2 cases which came under his personal observation. The first case probably belongs to the third group of Akerlund's classification. In this group the hernia occurs in the presence of a normal esophagus and the extremity of the esophagus forms a part of the contents of the hernial sac. The second case belongs to the first group of this classification, in which the hernia occurs in the presence of a congenitally shortened esophagus.

The first case was that of a sixty-five-year-old man who came to the clinic with a suspected lesion of the esophagus or the stomach. He had complained for the past few years of dyspepsia, acid eructations, and a feeling of tightness in the region of the xiphoid process during swallowing. Physical and roentgenological examinations of the stomach and esophagus failed to reveal any lesions. In

examining the patient in the prone position the opaque meal seemed to regurgitate into the esophagus. An insufficiency of the cardia was suspected, but on close fluoroscopic examination in different positions, the presence of a small hernia of the stomach projecting through the hiatus was discovered. These findings were confirmed by the presence of mucosal folds of the stomach above the level of the diaphragm and by the presence of a pocket containing an opaque substance. This pocket was about the size of a pigeon egg. It lay above the level of the esophageal lumen and was clearly demarcated from it.

The second case was that of a fifty-six-year-old woman who had been suffering for the past few years from dyspepsia. She experienced at various times attacks of melena, hematemesis, epigastric distress, and eructations. She vomited a watery mixture and presented anemia. For several years she had been treated for a duodenal ulcer without obtaining any relief.

When examined at the clinic, the sounds of the cardiac orifice of the stomach were not heard distinctly. The superior abdominal quadrants were somewhat resistant to palpation. On careful fluoroscopic examination after a fractional opaque meal, it was found that the esophagus was much shorter than normal. With the patient in the supine position, the bolus, after having traversed the esophageal hiatus, was seen to leave the antropyloric portion of the stomach and enter a large supradiaphragmatic sac. By means of adequate projection, it was found that the major portion of the stomach was herniated into the thoracic cavity through the esophageal hiatus.

Differential diagnosis had to be made in this case from a large perforating ulcer of the cardia with perforation of the diaphragm and an epiphrenic diverticulum.

The acute symptoms in both cases were probably due to strangulation of the hernial sac.

RICHARD E. SOMMA M D

## SURGERY OF THE ABDOMEN

## ABDOMINAL WALL AND PERITONEUM

Caulfield E Bile Peritonitis in Infancy *Am J Dis Child*, 1936 52 1348

Bile peritonitis in infancy is an extremely rare condition. Two cases are reported in detail. One infant apparently recovered completely following surgical intervention. The second infant died, and on post mortem examination revealed congenital stenosis of the common bile duct with obstruction, perforation of the common bile duct with peritoneal encapsulation, and generalized bile peritonitis. There was a striking similarity in the history of the 2 cases. Both developed signs of biliary obstruction and increased intra abdominal pressure.

In children the most common site of rupture is the common duct. Non-traumatic rupture in infancy, and traumatic rupture in older children often respond to surgical treatment, for even infants can tolerate sterile peritonitis for many days. The rupture of the common duct may be associated with congenital malformation.

ABRAHAM A. BRAUER, M.D.

## GASTRO-INTESTINAL TRACT

Palne, J R The Hydrodynamics of the Relief of Distention in the Gastro-Intestinal Tract by Suction Applied to Inlying Catheters *Arch Surg.* 1936, 33 995

Positive and negative pressures transmitted through a system of connected vertical rigid tubes, partially filled with fluid are decreased in their transmission because of the formation of unequal columns of water.

If a glass tube partially filled with water is bent to form loops in all 3 planes of space, the hydrostatic pressure at each end of the tube may be altered by changing the relative position of the system as a whole.

The nasal catheter suction siphonage apparatus used at the University Hospital is a water siphon so modified as to produce a continuous negative pressure within an attached duodenal tube. The effective negative pressure furnished by the apparatus depends on several factors, chief of which are the relative position of the bottles with respect to the distal end of the duodenal tube, and the relative proportions of fluid and gas aspirated at any one time.

The suction apparatus may be modified to produce any range of negative pressure up to 7,000 cm of water. By the interpolation of a third bottle the variations in negative pressure due to alternate aspirations of fluid and gas may be diminished. The third bottle may also be used to catch the fluid that is aspirated so that it can be returned to the patient if desired.

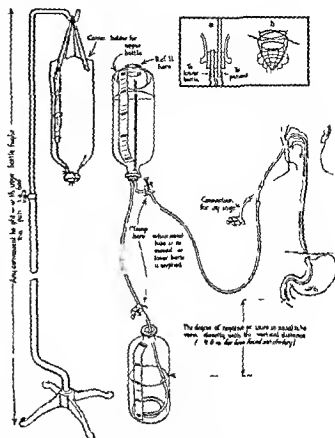


Diagram of the nasal catheter suction "phonag" apparatus used at the University Hospitals.

The quantities of gas and fluid aspirated can be calculated from readings on calibrated scales attached to the bottles.

The creation of negative pressure at one end of the distended small intestine of anesthetized dogs and of a distended human small intestine removed at autopsy caused immediate complete decompression of that portion of the intestine adjacent to the source of negative pressure and partial decompression of the remaining portions of the bowel.

The establishment of negative pressure at one end of the small intestine of anesthetized dogs, which intestines were distended partly with air and partly with water, produced a series of air traps and a graded pressure.

Decompression of the distended small intestine of anesthetized cats by suction applied to a duodenal tube was periodic. Better results were obtained when the tube was in the duodenum than when it was in the stomach. The most important factor favoring decompression appeared to be the movements of the intestines, either peristaltic or otherwise.

The factors which hinder decompression of the distended small intestine by suction are (1) the

formation of vertical columns of fluid and air traps (2) kinks in the bowel and (3) the collapsibility of the intestinal wall

Decompression of the distended colon by means of suction applied to inlying rectal tubes is far less satisfactory than decompression of the distended small intestine by means of suction applied to inlying duodenal tubes. This is due to the more solid nature of the contents of the large bowel and the tortuous course of the sigmoid flexure of the colon

CHARLES BARON M D

**Taylor H** *Gastrosocopy Its History Technique and Clinical Value with a Report on 60 Cases* *Brit J Surg*, 1937 24 469

This is one of the many articles written about the flexible gastroscope. It emphasizes the surgical viewpoint and presents some excellent colored pictures. The author briefly describes the instrument. He presents very interesting pictures of Rodger's new device which when used in conjunction with the Wolf Schindler flexible gastroscope permits better visualization of the upper posterior wall of the stomach. However, the author still uses the sponge tip which has been discarded in this country. He describes his technique in detail.

Taylor describes the endoscopic appearance of the stomach in 60 cases. He emphasizes the indispensability of modern gastrosocopy but contends that it is of little use in determining the operability of the growth.

ADOLPH SCHINDLER M D

**Schindler R**, **Ortmayer M** and **Renshaw J F** *Chronic Gastritis* *J Am M A* 1937 108 465

Recent histological and gastrosocopic research have shown that chronic inflammation of the stomach is very common. Severe conditions are easily recognized microscopically but the determination of the condition existing in surgically resected specimens is difficult. The normal histology of the stomach of the healthy adult is not well known. The author bases his article on 2500 gastrosocopic examinations.

About 50 per cent of the cases presented mucosal changes similar to those of chronic inflammation of other organs. Four forms were found:

1. Superficial gastritis in which hyperemic spots and purulent secretion were seen. This type either heals or develops into atrophic gastritis.

2. Atrophic gastritis. In this type the mucosa is a thin greenish gray.

3. Hypertrophic gastritis which is a separate clinical entity. The mucous membrane appears to be swollen and nodular often containing hemorrhages and erosions. The condition does not revert to normal. Recurrence of symptoms is frequent.

4. Gastritis after operation on the stomach in which condition all kinds of changes may be combined. Two hundred and twenty-eight cases were surveyed in order to definitely establish the symptoms. Fifty-three cases showing the most characteristic picture and not associated with any other disease were selected. However, no definite clinical

picture was found in a few cases a tender zone at the left side of the abdomen was present. Neither laboratory methods nor roentgenograms made it possible to make a diagnosis.

The treatment of the different forms and the possibility of gross hemorrhage or fatal ascending cholangitis are discussed. The authors do not consider chronic gastritis to be the cause of chronic gastroduodenal ulcer but they believe that atrophic gastritis may precede gastric carcinoma. The relationship between chronic gastritis and blood diseases is taken up. Gastritis always threatens to occur after gastric surgery. Gastrosocopy may show us how this danger may be avoided. Examination with the flexible gastroscope is safe and easy causing little discomfort and being the only method that permits an accurate diagnosis.

**ToLand C C** and **Thompson H L** *Acute Perforation of Gastrojejunal Ulcer* *Ann Surg* 1936 104 827

This article consists of a detailed critical review of the literature and a report of 50 new cases. The term "gastrojejunal ulcer" is used in this article to include all secondary ulcers situated at or adjacent to anastomoses between the stomach and the jejunum irrespective of their gastric marginal or jejunal location. The qualifying term "acute perforation" is restricted in this presentation to the use originally made of it in this country and means perforation of a peptic ulcer into the free peritoneal cavity.

The active treatment of acute perforation of gastrojejunal ulcer is surgical. In neglected cases with diffuse peritonitis injudicious surgery may not only be harmful but fatal. There are 2 schools of thought on the correct type of treatment. The adherents of 1 school maintain that simple suture is safest and therefore sufficient for the primary operation. It may be followed by medical treatment and by radical surgery later, if necessary. The members of the second school believe that in selected cases different measures are indicated. If the duodenal ulcer is healed and the pylorus patent the gastroenterostomy may be taken down and normal continuity restored. If an active peptic ulcer is present pyloroplasty or gastroduodenostomy in the first or second portion of the duodenum, or a Polya or Billroth type of gastrectomy should be done.

In the total of 203 cases, perforation of a gastrojejunal ulcer occurred 9 times as frequently in men as in women. Thirty-six per cent of the perforations occurred in the fourth decade of life and 49 per cent in the third and fifth. Ninety-two perforations occurred after gastrojejunostomy and 11 after a pyloric resection. The interval between gastrojejunostomy and acute perforation varied from 6 days to eighteen years. In 58 per cent perforation occurred within two years and in 84 per cent within five years after the operation. In 11 cases multiple perforations occurred at different times. There were 3 cases in which more than 1 perforation was present simultaneously. The site of the perforation was in the

stomach 3 times, in the anastomosis 19 times, and in the jejunum 74 times. Jejunal perforation occurred in the afferent loop 10 times, opposite the anastomosis 19 times, and in the efferent loop 45 times.

In 22 cases in which operation was not done the mortality was 90.9 per cent. There were 2 patients in this series who recovered but they required secondary drainage of an intraperitoneal abscess. Simple suture of the perforation was performed in 31 cases, with 9 deaths (29 per cent). Simple suture was combined with other procedures in 12 cases, with 1 death. In 63 cases in which a simple suture of the perforation was carried out with or without further procedures, the total mortality was 15.8 per cent. Disconnection of the gastrojejunostomy, restoring the normal sequential relation of the stomach and intestine, was done in 4 cases, with no deaths. Gastrojejunostomy alone, or combined with other procedures, was used in 7 cases, with 2 deaths, a mortality of 28.5 per cent. Pyloric resection with various types of gastro intestinal anastomosis was done in 17 cases and followed by 1 death, a mortality of 5.8 per cent.

There were 117 cases of acute perforation included in this study but the outcome was not recorded in 3. In the remaining 114 cases, 34 deaths occurred, a mortality of 29.8 per cent.

From the results obtained, the authors conclude that surgery and not expectant treatment, is indicated in acute perforation of a gastrojejunal ulcer. Disconnection of the gastrojejunostomy appears to be the safest procedure and should be carried out when the patency of the pylorus permits. Simple suture resulted in a mortality of 17.6 per cent, and required more secondary operations than the other procedures. Its simplicity, however, makes it applicable to the largest number of cases. Gastrojejunostomy resulted in a mortality of 28.5 per cent and in view of the findings it was not only ineffectual but also troublesome. It is contra indicated except when pyloric obstruction is present. The authors believe that the most remarkable finding with respect to treatment of acute perforation of gastrojejunal ulcer was the fact that in 17 cases wherein pyloric resection was carried out there was only 1 death representing a mortality of 5.6 per cent.

SAMUEL J. FOGELSON, M.D.

Scudder J. Zwemer R. L. and Truszkowski R.  
Potassium in Acute Intestinal Obstruction  
*Surgery* 1937, 1: 74

Acute intestinal obstruction and adrenal insufficiency have many features in common. In each, the cause of death has been attributed to dehydration, electrolyte loss, or to an unknown toxin. In a previous series of researches the authors have demonstrated that the various known symptoms of adrenal cortex insufficiency may be explained in terms of a disturbance of the cortico adrenal potassium interrelations. The increase of potassium in the blood in certain phases of adrenal insufficiency

was found to be of the same order as that associated with toxic symptoms in animals subjected to experimental chronic potassium poisoning. For these reasons it was felt desirable to investigate the variations in the blood potassium following acute intestinal obstruction.

Intestinal obstruction was produced in a series of 8 cats, in 4 the intestines were obstructed with jejunal loops of various lengths, while in the remaining 4 simple obstructions were effected at different levels of the alimentary tract. Aseptic technique, ether anesthesia, a mid abdominal incision, and a minimal amount of handling of the viscera made it possible for the animals to recover with little shock within one hour after the operation. There were no complicating wound infections. The blood potassium was determined by the Truszkowski-Zwemer method. The blood density was determined by the falling drop method of Barbour and Hamilton.

In 6 cats it was found that acute intestinal obstruction was associated with a rise in the blood potassium to levels which had previously been shown to be fatal. The potassium content of the obstructed loops, the peritoneal fluid, and the vomitus was many times that of the blood. The potassium rise is attributed to some combination of dehydration, tissue breakdown, and action of bacterial toxin, with consequent adrenal and renal dysfunction and inadequate potassium elimination. The blood density parallels the rise in most instances. It is suggested that potassium is the dialyzable toxic factor sought in acute intestinal obstruction.

JOHN W. NUZZUM, M.D.

Friedlaender, G. Diverticula of the Duodenum  
*Brit J Radiol*, 1937 10: 26

Diverticula of the duodenum have been recognized with greater frequency since the time of X-ray diagnosis. Radiologists have found them in 1 to 3 per cent of their cases of gastric disturbances, and pathologists in up to 5 per cent of their post mortem examinations.

The author considers 2 types of diverticula, the primary and the secondary. The walls of the primary diverticula are usually formed by only some of the duodenal layers, but those of the secondary diverticula are formed by all of the duodenal layers. The primary diverticula correspond roughly to the false, and the secondary, to the true, diverticula of the old classification. Secondary diverticula are confined to the first part of the duodenum, but primary diverticula are to be found in any part of the duodenum with the exception of the duodenal cap.

Primary diverticula are generally formed by protrusions of the mucosa and submucosa through a gap in the muscularis, their wall is formed by mucosa, submucosa, and peritoneum. A number of theories have been presented as to their origin. Any one of the theories may occasionally be correct, but they certainly are not correct in the majority of the cases. The author believes that increased pressure from

within the intestine may in the course of time cause a separation of the muscle fibers in areas of congenital local weakness of the muscular coat of the bowel.

Of 13 patients with gastric disturbances observed in a series of 1,000, 11 were over and only 2 under forty-four years of age. The occurrence of diverticula at or near the inner side of the duodenal ring in most of the cases may be explained by the fact that the blood vessels joining the duodenum at the inner side create weak spots. In addition, the tension on the inner side may be less and therefore the muscle fibers may be more readily separated by pressure from within. Primary diverticula are found most commonly in the second and fourth part of the duodenum near the duodenojejunal flexure. A single diverticulum was found in 7 cases, 2 diverticula in 3 cases and 6 diverticula in 1 case. Most of the authors are of the opinion that the clinical significance of primary diverticula is not very great. In any case diverticulitis and peridiverticulitis of the duodenum are very rare in comparison with similar processes in the colon.

In most of the cases in the author's series all the symptoms disappeared completely or improved considerably under dietetic treatment. This fact seems to prove that the diverticula were not the cause of the symptoms. No operations were done. Secondary diverticula occur almost invariably in the beginning of the first portion of the duodenum, the duodenal cap, if they are well developed they are always a late result of an old duodenal ulcer. The walls of secondary diverticula are formed by all of the layers of the intestinal wall. It is uncommon to see a large amount of food stay in a secondary pouch if the stomach has emptied. Secondary diverticula nearly always prove the presence of an old standing duodenal ulcer. Therefore all the symptoms and sequelae of such an ulcer as pain, hyperchlorhydria, hemorrhages, perforations and stenosis may occur. Operation will often be the method of choice in treating a secondary diverticulum if medical therapy has failed.

The significance of the so-called diverticula of the papilla of Vater is not clearly understood. Anatomical examinations have shown that the mouth of the biliary papilla is sometimes situated at the bottom of a distinct depression, therefore the shadows observed cannot always be regarded as abnormal. The filling and emptying of the diverticula and their connection with the duodenum can often be seen much better by screening than on the film. Serial pictures taken during screen examinations are very helpful in fixing the findings.

HAROLD C. OCHSNER, M.D.

Cotti, L. Anemia Produced by Ankylostoma Duodenale (L'anemia da anchilostoma duodenale). *Arch. ital. di mal. dell'appar. digerente* 1936, 3, 443.

Cotti discusses the gastro-intestinal disturbances which have been observed in the clinical picture of anemia produced by ankylostoma duodenale. Patients who are infected with this worm often present

a series of vague and ill defined gastro-intestinal disturbances due to organic changes which are produced almost selectively in the upper portion of the small intestine.

The author had the opportunity to observe a great number of cases of hookworm infection in the Province of Pavia, where the incidence of this disease is the highest in Italy.

The syndrome in the gastro-intestinal tract is often easily confused with that of other disorders involving this tract for instance duodenal ulcer. A differential diagnosis is therefore of utmost importance. In many cases there are manifestations of enteritis or the patient may complain of dyspepsia. In other cases, a gastro-intestinal attack may be followed by an asymptomatic period during which the anemia becomes more marked. Usually however the patients complain of diffuse pain in the various abdominal quadrants especially in the periumbilical and epigastric regions. The abdomen may be distended and diarrhea with elimination of mucus in the feces may occur. Ventral attacks of dysentery with severe colic, tenesmus and profuse diarrhea have also been observed. Associated with these attacks may be symptoms typical of duodenal ulcer such as preprandial and postprandial epigastric distress. The distress is relieved by taking food. There is distinct tenderness on pressure over the epigastric region.

Besides the patients presenting ulceropatie symptoms the author has observed a large number of patients presenting atony of the gastro-intestinal tract which was readily visualized with the roentgen rays. The duodenal cap appears to be dilated and the gastric wall is hypotonic. Peristaltic waves are infrequent and not sufficiently strong to empty the stomach completely.

To complete the syndrome in these cases it should be remembered that in ankylostoma infection patients often have a voracious appetite and their sense of taste is frequently altered.

The author has also studied the chemistry of the gastric juice in cases of anemia produced by ankylostoma duodenale. The acidity and the degree of peptic activity of the gastric juice were determined in the fasting condition and after stimulation with caffeine. In one group of patients hypochylia was found. In another group the values obtained were normal whereas in a small third group there was evidence of hyperacidity. No relation was found to exist between the gastric secretion and the severity of the anemia. The abnormal values of the gastric juice were rapidly restored to normal in every case following the administration of helminthiasis.

RICHARD E. SOMMA, M.D.

Saller, L. M. A. Late Results in Acute Perforated Peptic Ulcer Treated by Simple Closure. *Ann. Surg.* 1936, 103, 833.

Seventy-four cases of acute perforated peptic ulcer were treated by simple closure and the late results are reported in this study. The patients were ad-

mitted to the Beekman Street Hospital, New York, between 1926 and 1933, inclusive. A postoperative period of at least twelve months had elapsed in each case considered. Thirty four of the patients were examined recently and of the remaining 32, 13 answered a questionnaire. A total of 45 patients were therefore available for study.

It is interesting to note that all of the 74 patients were males; that 41 of the ulcers were prepyloric, 26 duodenal, and 7 pyloric. Eighty six per cent of all the patients had a previous ulcer history and 63 of the 74, presented a clinical picture so typical that the diagnosis could readily be established. Of 11 patients remaining, 3 presented difficult diagnostic problems. Two were believed to have coronary disease, and the third, an intestinal neoplasm with pyloric obstruction.

The 74 operations were performed by 9 surgeons. They made a simple closure, usually with a purse string suture but in some cases they used a mattress or figure eight suture. As a rule there were 3 suture layers and the omental tab was included in the last one. The total mortality was 10.8 per cent.

The results were classified as good, bad, and fair. In the cases with good results the patients remained symptom free after a reasonable period of dietetic and hygienic care. In the cases with poor results the patients reported periodic recurrences regardless of whether the symptoms were true ulcer symptoms or severe. In the cases with fair results the patients reported recurrence of the symptoms, but they were mild, inconstant and not entirely typical of ulcer. By these standards 15 of the 32 patients who were followed up and examined, presented poor results, 6, fair, and 9 good. The symptoms recurred in 23 of the 32 patients (71.7 per cent). The questionnaire report on the 13 patients showed 5 poor, 1 fair, and 7 good results. Six of these patients (46 per cent) had recurrence of the symptoms. In the total group of 45 patients, 29 (64 per cent) presented further significant gastric symptoms. In addition, 5 of these 45 patients required some additional surgery.

From the data presented the conclusion is drawn that routine use of simple closure, with its low mortality rate and excellent early results, is justified in the emergency treatment of acute peptic ulcer perforation. Gastroenterostomy is rarely indicated because of mechanical reasons, no matter how extensive the induration nor how great the apparent pyloric distortion after plication. Acute perforation followed by successful closure affords a permanent cure of the ulcer in only a minority of the patients because in almost 2 of every 3 cases peptic ulcer will recur later with greater or lesser severity.

SAMUEL J. FOGELSON, M.D.

Muglia D. A Rare Case of Sarcoma of the Duodenum (Un raro caso di sarcoma del duodeno). *Radiol. med.*, 1936, 23, 931.

The author reports a case of fibrosarcoma of the duodenum in a woman forty eight years old. The

diagnosis was made from roentgenograms and confirmed by exploratory laparotomy and biopsy.

In the discussion Muglia emphasizes the variety of clinical pictures presented by the disease and the consequent difficulty of diagnosis. Radiological examination gives the most decisive information.

Roentgenograms and references accompany the report. M. F. MORSE, M.D.

Fenster, E. Ulcerative Ileitis (Ileitis ulcerosa). *Beitr. z. klin. Chir.*, 1936, 164, 462.

The author discusses in detail 15 cases of ileitis found in the literature and reports 4 cases of his own.

The clinical signs of this condition are fever, loss in weight, and diarrhea, generally with the picture of appendicitis. The site of the disease is in the terminal portion of the ileum, usually just above the ileocecal valve. From this point the disease progresses from 20 to 30 cm toward the mouth. Macroscopically, there appears to be a phlegmonous inflammation of the intestine, while microscopically there are ulcerative changes of the mucosa with a marked fibrous tissue reaction. The progressive narrowing of the bowel leads to subileus, and finally to total obstruction. The condition may be differentiated from ulcerative colitis by the opaque meal and the x rays, which show a definite slowing up of movement, while the opaque enema shows a normal colon. Nothing definite is known concerning the cause. Konjetzny at one time believed it was due to the ingestion of radishes, while others believe that it is due to changes in the intestinal flora. Both sexes are affected about equally. The age of the patients is variable, and the duration of the disease varies from a few hours to many years. Usually, however, in cases that progress rapidly, only operation can prevent a fatal outcome. The treatment consists in resection of the involved segment of the intestine.

Fenster reports his 4 cases as follows:

1. A sixty three year old female was sick for three days with mild abdominal pain which became progressively worse and localized in the right side. Operation was performed immediately. It consisted of resection of 185 cm of small intestine and end to end anastomosis. Death occurred on the fifth day from apparent cardiac weakness. Autopsy was not performed. The specimen of small intestine was markedly swollen, it contained fetid, gaseous, dark red stool. The mucosa was hemorrhagic.

2. A forty one year old farmer was ill for two days with a distended abdomen and constipation. His temperature was 39.4° and his pulse, 135. The condition had been referred as appendicitis, and operation was performed immediately. More than 30 cm of the small intestine was very red, and swollen to triple its normal size. The normal appendix was removed. Shiny exudate was found in the abdomen. The patient was discharged cured.

3. A seventy five year old farmer's wife became ill on the day before she was admitted to the hospital. She complained of pains in the entire abdo-



men, especially on the right side. Operation was performed immediately as the condition was believed to be appendicitis. The appendix was red and thickened in its midportion and was removed. The small intestine was very red and felt thickened for 15 cm. Death occurred after three days. Autopsy showed hemorrhagic necrotic ileitis. Microscopic examination revealed a mucosa which was deeply ulcerated and necrotic. The submucosa was widened and the musculature was swollen with edema.

4. A twenty-one year old female became ill on the day before admittance with pain in the right abdomen. Immediate operation was performed. The appendix was found to be only mildly red. The distal small intestine was bluish and its wall was thickened for 10 cm. Only the appendix was removed. The patient was discharged in ten days as cured. (J. VOLLMANN) WILLIAM C. BECK, M.D.

Gatta, R. Argentaffine Cells in the Connective Tissue of the Human Appendix. (Sulle cellule argentaffine nel connettivo dell'appendice nell'uomo). *Arch. ital. di mal. dell'appar. digerente* 1936 5: 423.

Gatta states that there are certain types of cells in the intestinal epithelium which have been described a long time ago and named argentaffine cells. These cells are characterized by (1) chromaffinity (2) argentaffinity and (3) a characteristic diazo reaction. They are especially common in the appendix.

The author has made a series of observations on 52 human appendices, 4 of which were removed during abdominal operations not performed for appendicitis. Together with Pessin he subdivides argentaffine cells of the intestine into (1) glandular argentaffine cells which are found within the epithelium and (2) periglandular argentaffine cells which are found in the connective tissue.

He studied the periglandular cells especially and observed that they occur usually near the bottom of the glands and often in immediate contact with the epithelial cells. They are generally isolated but sometimes they are found in groups. The cells are most commonly found in the tunica propria and between the fibers of the muscularis mucosae but never beyond this layer.

The cells are usually oval in shape with a regular contour. The cell body stains black with silver and the cytoplasm contains granules and sometimes vacuoles. The nucleus is usually masked by the overlying protoplasmatic granules.

It is believed that the function of these cells varies according to the function of the tissue in which they are found: those in the epithelium having a glandular function and those in the connective tissue a nervous function. Some believe there is a relationship between the argentaffine glandular cells and the corresponding periglandular cells and the majority believe that the argentaffine cells originate in the connective tissue of the epithelial submucosa whence they migrate actively into the epithelium.

From his observations the author found that in freshly obtained specimens the glandular cells are much more numerous than the connective tissue cells. He found also that the number of periglandular argentaffine cells in moderately inflamed appendices was greater than the number in appendices which were either profoundly altered or almost normal.

From a series of histological and chemical studies he concludes that the glandular argentaffine cells are identical with the argentaffine cells found in the connective tissue. He believes that the latter are derived from the cells occurring in the glands, and that they migrate passively during inflammatory processes. It has been suggested that they play a considerable rôle in the proliferation of nervous fibers. RICHARD E. SOMMA, M.D.

Collins, D. C. Diverticula of the Vermiform Appendix. *Ann. Surg.* 1936 104: 1001.

Collins has reviewed the literature on diverticula of the appendix from 1819 to 1934. In examinations of 16,044 appendices removed at operation or autopsy 67 diverticula were found. The average incidence of diverticula in the appendices covered by 11 reports was 0.42 per cent. Of 60 diverticula reported in the literature 45 per cent occurred in the middle of the appendix and 59.9 per cent were single. Sixty three per cent were on the meso-appendiceal border and 36.7 per cent on the free portions of the wall.

Collins has studied 30 appendiceal diverticula which were found in 23 (0.77 per cent) of 3,011 appendices removed surgically and 7 (0.66 per cent) of 1,054 appendices examined at autopsy.

The diverticula were located at the tip and in the distal third of the appendix in 59.77 per cent of the cases, in the middle third in 29.29 per cent and in the proximal third in 11.12 per cent.

In 43.29 per cent they were at the meso-appendiceal border and in 56.61 per cent elsewhere on the free portion. In the author's opinion this fact indicates that the majority of appendiceal diverticula are of inflammatory origin.

In 29.97 per cent of the cases the diverticula were single. In 60 per cent they were associated with acute inflammation and in 16.6 per cent had perforated. In 3 cases perforation of the diverticulum had resulted in pseudomyxoma peritonei.

The abnormal thickening of the walls of the appendices and the stenosis of the lumen which were invariably associated with the presence of a diverticulum are shown by illustrations. In the author's opinion, both of these changes are indications of an inflammatory origin of the diverticula. The stenosis is probably an important causative factor. Only 2 of the diverticula reviewed were believed to be of congenital origin.

In conclusion Collins states that appendiceal diverticula are of importance because acute inflammation of an appendix with a diverticulum produces atypical signs and symptoms and commonly early

rupture which often results in generalized peritonitis or pseudomyxoma peritonei. Therefore during the course of abdominal exploration the appendix should be examined for diverticula, and if a diverticulum is found appendectomy should be done.

LORNE W. CHRISTIAN, M D

Cattell R B Improvements in the Treatment of Cancer of the Rectum *J Am Med Ass*, 1936, 107, 2011

Any polyp of the rectum, irrespective of its size or benignancy, should be immediately treated by fulguration. After this treatment, follow up examinations should be made to determine whether the mucosa remains smooth over the area treated. By this means the development of carcinoma of the rectum from a polyp may be prevented. Whenever a polyp is discovered in the rectum, an examination with the barium enema and double contrast enema should be made to determine whether polyps are present also higher in the colon.

Careful attention to adequate pre operative preparation and decompression of the colon has permitted a 1 stage operation to be performed in many cases of cancer of the rectum in which, otherwise, a 2 stage resection would have been necessary.

The greatest progress in the treatment of cancer of the rectum in recent years has probably been made in the selection of the type of operative procedure for the individual patient and in the performance of the operation chosen. As patients with carcinoma of the rectum are frequently poor operative risks, the operative mortality may be high if a radical abdominoperineal operation in 1 stage is carried out routinely. It must be admitted, however, that abdominoperineal resection in 1 stage would be the ideal operation for every cancer of the rectum from the standpoint of the greatest possible number of cures.

The most enthusiastic proponent of the 1 stage abdominoperineal resection is aware that there are a considerable number of cases in which the operation is not applicable. Patients with a lesion which is of borderline operability because of local extension, inflammation, and possibly abscess should be operated upon by one of the 2 stage types of operation. Moreover, most patients fifty five years of age and older withstand a 2 stage operation better than a 1-stage operation.

There is also a group of patients who, because of cardiovascular disease, obesity, advanced years, or general debility, are unable to withstand a radical abdominoperineal resection performed in either 1 or 2 stages. In the cases of such patients a more local type of resection should be done, particularly if the lesion is located in the lower segment of the rectum. Such an operation first described for the excision of carcinoma of the rectum by Kraske and later modified by a number of surgeons, is of great value. It must be done in 2 stages, the first stage a double-barreled or loop colostomy, and the second a removal of the rectum through a perineal incision.

Radium and x ray therapy should be used only in inoperable cases. In every operable case, however early the stage of the lesion, a radical resection should be done.

The local treatment of early carcinomatous lesions by fulguration or cauterization is still in the trial stage, and offers little prospect of success. Coagulation should be limited entirely to inoperable cases.

The author believes that in cases with early metastases to the liver resection of the primary growth is justified if the general condition is good. In cases with local extension of the growth in the pelvis, resection should be done whenever it is technically possible. It is in this group particularly that the 2 stage abdominoperineal resection is applicable.

Resection of the presacral nerve during the course of operation for carcinoma of the rectum is easily done in the unfavorable cases. It is suggested that this procedure be carried out routinely in unfavorable cases, even those in which only colostomy is justified.

Definite progress has been made in anesthesia for operations for cancer of the rectum. Spinal anesthesia is now employed routinely in all the better risks. The use of metycaïne and nupercaine, the latter in dilute solutions, rather than procaine, permits a longer period of spinal anesthesia with the same degree of safety. Ethylene or cyclopropane may be used if necessary for completion of the perineal portion of the operation. The operative conditions produced by spinal anesthesia permit the surgeon to carry out the work under direct vision more expeditiously and more safely than under general ether anesthesia. Patients who are poor risks are advantageously operated upon under general anesthesia induced with cyclopropane and field block of the lower abdominal wall.

Transfusions should be given routinely following resection. Pulmonary complications, particularly postoperative pneumonia, infarct, and massive pulmonary emboli, are still the major causes of death. Postoperative urinary infection is very common because of the manipulation of the urinary tract and sagging of the bladder into the hollow of the sacrum with resulting stasis. Therefore in all cases constant bladder drainage should be established for from seven to ten days following operation. In many instances bladder irrigation and occasional pelvic lavage by cystoscopy are necessary during convalescence.

JOSEPH K. NARAT, M D

#### LIVER, GALL BLADDER, PANCREAS, AND SPLEEN

Colp, R., and Doubilet, H. Differential Analysis of Bile Acids in Human Gall-Bladder Bile. *Arch Surg*, 1936, 33, 913.

The acids of human bile consist of a mixture of cholic, desoxycholic, anthropeoxycholic, and lithocholic acids, combined mainly with taurine and amino acetic acid (glycine) to form the conjugated bile acids. A method for the differential bile acid

analysis of human bile has been reported recently. By combining 3 different methods human bile can be analyzed for bile acids combined with tannine and with amino acetic acid for cholic acid for desoxy cholic acid and for free bile acids.

The bile for analysis was obtained from the gall bladder of 45 patients operated upon for chole cystitis and analyzed for bile acids by means of these methods. The bile was aspirated from the fundus of the gall bladder immediately upon opening the peritoneal cavity and the analysis was carried out on the fresh bile. Bile was obtained from several persons in whom the gall bladder and the liver were apparently normal. Analyses were made also of the bile from patients with carcinoma of the head of the pancreas.

Two important facts are apparent from a study of the figures presented. No reliance can be placed on any one method of analysis. In cases of chronic cholecystitis the ratio of the cholic acid and the free bile acid content to the total bile acid content varies markedly and consistently as compared with the ratio in cases of acute cholecystitis. In a number of cases in which the gall bladder was found to be normal analysis of the bile from the gall bladder revealed that the bile acids consisted of about 30 per cent cholic acid and 50 per cent non cholic bile salts mostly desoxy cholic acid. The bile acids were conjugated to the extent of about 80 per cent half with taurine and half with amino-acetic acid. In cases of chronic cholecystitis cholic acid formed about one third of the total bile acid content in the bile from the gall bladder. In acute cholecystitis only about one sixth of the total bile acid content was cholic acid. Free bile acids formed about one third of the total bile acid content in cases of chronic cholecystitis and one half in cases of acute cholecystitis.

Bile acids are absorbed rapidly by the inflamed wall of the gall bladder. In 2 cases in which a pathological condition of the liver was present analysis of the gall bladder bile revealed the proportions of the various bile acids to be similar to those found in the bile in cases of acute cholecystitis.

JOHN W. NUTZ, M.D.

Colp, R. and Ginzburg, L. Mortality in Surgical Diseases of the Biliary Tract. *Ann Surg* 1937 103, 9.

The authors studied the cause of death in 130 autopsies following surgical disease of the biliary tract. The patients had died following operations and as the result of non malignant disease too severe to permit operation. Many of the deaths represented the unavoidable end result of the economic circumstances of any group of patients admitted to the wards of a large metropolitan hospital. The cases were divided into 3 main groups.

In the first group the disease process or its complications were found to be the eventual causes of death. Suppurative cholangitis was found in 16 cases. This dreaded complication the result of

prolonged incomplete obstruction and low grade infection ended either in multiple hepatic abscesses with or without perforation, portal or hepatic suppurative phlebitis or general sepsis or cholangitic hepatitis. The post mortem findings clearly present the final result of years of operative delay, due either to lay ignorance or medical indifference to the excellent results derived from early surgical intervention. However the importance of operative therapy in obstructive jaundice is fast being recognized as shown by the relatively few deaths from hemorrhage (only 3).

The second group of cases were of the interval type in which the disease at the time of operation was not threatening to life. The fatal outcome could be traced either to errors in judgment or technique or to those complications following operation which at present seem to be almost unavoidable. Diffuse peritonitis due to biliary extravasation, operative injury of viscera adjacent to the gall bladder or the exacerbation of a latent cholecystic infection accounted for 13 deaths. Operative injuries or subsequent traumatic strictures of the extrahepatic bile ducts caused 10 deaths. These fatalities approximately 10 per cent of all occurring in benign cases are a serious reflection upon surgery because they are directly attributable to technical mistakes which probably could have been avoided by greater operative care. Wound dehiscence an almost unwarranted complication caused death in 3 cases. Hemorrhage due to failure to secure the cystic artery or control bleeding from the liver bed was not encountered in the series. Two deaths were due to uremia and 7 others with a clinical picture resembling uremia were due to definitely extrarenal anatomical causes. Three cases presented a clinical picture resembling uremia but without definite renal changes at post mortem. These deaths are frequently attributed to hepatorenal insufficiency. Pneumonia in spite of all efforts directed toward its prophylaxis in recent years caused 11 deaths, 11 per cent of the total. Three deaths were caused by heart failure and 2 by pulmonary embolism. No cases of 'liver shock' were observed following cholecystectomy.

The third group of cases were operated upon for gall bladder disease in which neither pre-operation nor post mortem findings verified the diagnosis. The diseases were found to be subacute yellow atrophy of the liver, non suppurative cholangitis and biliary cirrhosis. A more careful pre-operative evaluation of the symptoms and findings might have prevented a number of surgical mortalities.

Finally, there was another group consisting of 18 cases of carcinoma of the biliary tract. Autopsies failed to disclose the presence of visible gross metastases in the majority of the cases with malignant lesions involving the papilla and the extrahepatic bile ducts. These findings emphasize the fact that it is well worth while to attempt the radical extirpation of these malignant lesions.

HARRY W. FINE, M.D.

Lichtenstein, M. E. and Ivy, A. C. The Function of the "Valves" of Heister *Surgery*, 1937, 1 38

On the basis of numerous experimental studies of the "valves" of Heister, various opinions of the function of these structures have been expressed. Some have suggested that they impede the flow of bile into the gall bladder, while others have suggested that they impede or prevent the flow of bile from the gall bladder. Keith has suggested that they prevent collapse of the cystic duct by providing support to the walls of the duct. They have been regarded as baffle plates to secure a slow passage of viscous bile from the gall bladder, without opposing the flow of thin hepatic bile into the gall bladder. Studies have been made also on the pressure required to force fluid through the cystic duct in either direction. Lohner observed that less pressure was required to cause fluid to flow into the gall bladder than out of it. Mentzer concluded that the "valves" check the rapid passage of fluid into or out of the gall bladder, while Johnson and Brown found no real impediment to the passage of fluid into or out of the gall bladder when the pressures found normally in the gall bladder were used.

In an attempt to throw further light on the subject, the authors performed a series of experiments on human gall bladders removed within from twelve to twenty four hours after death with their cystic, hepatic, and common ducts attached. The ducts and fundus of the gall bladder were then cannulated and irrigated with various fluids, and studies of the different pressures were made. It was found that pressure variations on either side of the valvular portion of the cystic duct were not influenced by the presence of the "valves". Accordingly, the authors believe that the variations in pressure noted by other observers were due in all probability, to the presence of the bends in the neck of the gall bladder.

The "valves" of Heister are of interest from the embryological standpoint. They appear late in the phylogeny of mammals, being found only in primates. The human gall bladder is derived from a rapidly growing tube lying in a more slowly growing mesodermal bed. The difference in the rates of growth causes numerous foldings and windings to form, in order that the gall bladder may be accommodated in its liver bed of limited space. Early in development the cystic artery limits the longitudinal growth of the neck and cystic duct. Folds occur commonly in the fundus and body of the gall bladder and represent the most frequent anomaly of the human gall bladder. The "valves" of Heister are an embryological formation caused by the winding or longitudinal compression of the duct during its development. The variations in the number and size of the "valves" and their absence in the more distal portion of the cystic duct are due to the variations in the size of the parts that take part in the foldings and winding.

The authors express the opinion that the "valves" of Heister are an architectural device, the function of which is to prevent distention or collapse of the

cystic duct in the presence of changing pressures in the gall bladder and common duct.

ARTHUR S. W. TOUROFF, M.D.

Thompson, W. P. Hemolytic Jaundice *J. Am. M. Ass.* 1936 107 1776

A study of 45 cases of hemolytic anemia with jaundice and splenomegaly which was made in the Clinic on Splenopathy of the Vanderbilt Clinic and the Presbyterian Hospital, New York, led to the following conclusions:

1 The syndrome of chronic variable acholuric jaundice, chronic variable anemia with regeneration, and moderate to marked splenic enlargement indicates the presence of a hemolytic process.

2 Cases presenting this syndrome may be divided into 2 groups: (a) those of typical hemolytic jaundice, and (b) those of atypical hemolytic anemia.

3 The first symptoms in either group may occur at any age. Both conditions may occur in any race. There is no sex difference in their incidence.

4 Although a family history of a similar process is somewhat more common in the group of typical hemolytic jaundice, it may be present or absent in either group. The former subdivision of cases into congenital and acquired types is no longer valid.

5 Typical hemolytic jaundice is a definite disease entity, the diagnosis of which depends upon the finding of spherical microcytes with their attendant fragility changes in the peripheral blood. Once the active phase of this disease is established it will continue, with fluctuations in intensity, until splenectomy is performed. The pathological changes in the spleen are uniform and characteristic. Splenectomy results in immediate cessation of the increased hemolytic activity with prompt return of the blood values to normal. These brilliant results have been observed in all cases and have persisted for as long as sixteen years after splenectomy.

6 The atypical hemolytic anemias comprise a heterogeneous group of disturbances associated with increased blood destruction and splenic enlargement. In some of the cases the primary disturbance has been neoplastic, in others infectious in many unknown. For obvious reasons, splenectomy is not indicated in this group.

7 Correct clinical diagnosis before operation is essential.

LOUIS SPERLING, M.D.

Brown D. N., and Elliott, R. H. E. The Results of Splenectomy in Thrombocytopenic Purpura *J. Am. M. Ass.* 1936 107 1781

The authors review the history of thrombocytopenic purpura and the literature on splenectomy in the treatment of that condition. They then report in detail 21 cases of idiopathic thrombocytopenic purpura observed during the last sixteen years. Splenectomy was performed in 10 of these cases and the patients were followed postoperatively for from eleven months to five and one half years. During the same period, 11 patients not treated by splenectomy were observed for a similar length of time.

In 72.6 per cent of the 21 cases the disorder manifested itself in the fourth decade of life. The ratio of female to male patients was 4:1. Of the 7 patients who developed the disease in the first decade of life, 6 were females. At the time of the first examination skin purpura was found in 19 cases and bleeding from the mucous membrane in 11. In no case did the platelet count exceed 45,000.

On pathological examination of the removed spleens nothing unusual was found. After splenectomy the platelet count rose to 100,000 or more. In 1 case it increased beyond 1,000,000. After the increase it fell in 2 cases to less than 100,000. In every instance the operation was followed by immediate improvement to some degree in the clinical symptoms. In 5 cases all evidence of hemorrhage ceased within seventy-two hours and in at least 2 it ceased at once. Five of the patients have been entirely asymptomatic since their discharge from the hospital. However, the platelet level of 1 has remained consistently low and 4 had a mild intermittent purpura throughout the follow-up period despite a normal or even slightly elevated platelet count. The discrepancy between the platelet level and the bleeding has been commented upon by others. In the reviewed cases there was no operative mortality but 1 patient died eight months after the operation of cerebral hemorrhage.

Of the patients treated by splenectomy, 80 per cent showed marked improvement and 10 per cent showed no improvement or died. Of the controls only 27.2 per cent showed improvement and 54.5 per cent showed no improvement or died.

The authors conclude that splenectomy is a very effective form of therapy in selected cases of thrombocytopenic purpura. ROBERT ZOLLINGER, M.D.

Rousselot, L. M. The Role of Congestion (Portal Hypertension) in So Called Banti's Syndrome. *J. Am. M. Ass.* 1936 107:1788.

The possible factors in the production of Banti's syndrome are discussed and the symptoms and

results in 31 cases are reported. In the latter there was enlargement of the spleen with anemia of varying severity and leukopenia. In many intestinal hemorrhages, and in some ascites occurred. There was no known etiological factor, except possibly in 3 cases. Among the common symptoms were gradual weakness in 16 cases, gradual enlargement of the abdomen in 12 cases, and pain in about 42 per cent of the cases. In 11 cases the first sign of the condition was hematemesis. Cardiac and urinary symptoms were rare. The only consistent laboratory findings were anemia, leukopenia and occasionally thrombocytopenia. In 15 cases no obstructive mechanism was demonstrable either at operation or subsequently. Some form of cirrhosis was present in 13 cases, thrombosis of the splenic vein in 7 and a cavernomatous transformation of the portal vein in 1. In the 9 cases with Laennec cirrhosis and Banti's syndrome there was an immediate mortality of 22 per cent. Sixty-six per cent of the patients were well from two to thirteen years after operation. All of the patients with unclassified cirrhosis, schistosomiasis, mansonii or thrombosis of the splenic vein did well. The patient with cavernomatous transformation died of massive hematemesis forty-eight hours after operation. In the 15 cases in which no obstructive factor could be demonstrated the hospital mortality was 13 per cent and the late mortality 20 per cent.

The remaining 10 patients continued in excellent health for a period of ten years. However 1 of them had repeated hematemesis during that period. Seven of the 11 patients who had esophageal hemorrhages prior to operation died. The author believes that surgery is contra-indicated in cases of hematemesis. There was a very favorable response in the blood picture after operation with an average leucocytosis of 12,000. In all of the cases of Banti's syndrome portal hypertension was probably present. The author believes that splenectomy is contra-indicated in the presence of severe liver damage.

ROBERT ZOLLINGER, M.D.

# GYNECOLOGY

## UTERUS

Celentano. Perithelioma of the Uterine Cervix (Pentelioma del collo dell'utero) *Arch di ostet e ginec*, 1936, 43 437

Perithelioma is defined as a tumor arising from the adventitia of the vessels, it is a specialized type of endothelioma. Except in the early stages, its appearance is not very characteristic, it may resemble sarcoma or carcinoma. Indeed, some deny that there is a specific tumor which may properly be called perithelioma and call such tumors sarcomata while some call them carcinosarcomata. The author believes that true peritheliomas exist and describes them as follows:

They originate from adventitia of small vessels. As they form in the external wall of the vessels and then present degeneration, their appearance is similar to that of a sarcoma or a carcinoma. Therefore, it may be impossible to find characteristic areas unless careful search is made, but they are most likely to be found where the tumor borders the normal stromal tissue. The association with the blood vessels is the most characteristic feature, and when this association is not found the proper diagnosis may be missed. The cells may be cubical or cylindrical, and contain large nuclei in a granular cytoplasm. Each cell is likely to differ from its neighbor. Occasionally an alveolar arrangement is present. The stroma is a rather abundant connective tissue containing but a few vessels. Many intercellular fibrils form a veritable rete. The stroma and parenchyma are intimately associated, much more so than in the case of carcinoma. Silver staining demonstrates the presence of collagen and precollagen in relatively large quantities.

Very few cases of perithelioma of the cervix have been reported. The author believes that many cases are confused with inflammatory lesions of the cervix, carcinoma, and sarcoma.

The author reports a case of a woman thirty one years old, a para vii. She had had a yellowish vaginal discharge, occasionally stained with blood, for several years, and a bloody discharge after coitus for some months. She experienced a feeling of heaviness in the lower abdomen and the pelvis. Examination revealed a small vegetative growth on the right side of the cervix which bled easily on manipulation. The fornices were free, and the uterus was slightly enlarged and mobile. A diagnosis of cancer was made. However, the biopsy revealed a perithelioma. A radical Wertheim operation was performed. The patient made a prompt recovery. An examination of the specimen revealed a growth with characteristics similar to those described. The growth involved the lower third of the cervix, and had penetrated its walls quite deeply.

DANIEL G. MORROW, M.D.

## ADNEXAL AND PERIUTERINE CONDITIONS

Israel, S. L. Ovarian Rupture Causing Intraperitoneal Hemorrhage. *Am J Obst & Gynec*, 1937, 33 30

Rupture of the graafian follicle is a normal occurrence in the ordinary cycle of ovarian activity. It is accompanied by little bleeding because the tenuously stretched point of perforation (stigma) is relatively avascular. However, moderate hemorrhage may occur when abnormal conditions which cause hyperemia of the thecal vessels adjacent to the stigma are present. On the other hand, rupture of the corpus luteum is an unnatural phenomenon and is generally accompanied by bleeding. The premenstrual hyperemia and capillary hemorrhage give rise to a corpus luteum hematoma which, if sufficiently tense, may rupture spontaneously through the stigma, lacerate the adjacent thecal vessels, and cause intraperitoneal hemorrhage.

The amount of free blood found in the peritoneal cavity after ovarian rupture may vary from one half ounce to several liters. The ruptured portion of the ovary is usually adherent to the posterior surface of the uterus and discharges varied amounts of hemorrhagic material.

Histologically, the origin of the ovarian hematoma may prove to be a graafian follicle, an atretic follicle cyst, a maturing corpus luteum, or a corpus luteum cyst.

A characteristic relationship exists between the time of ovarian rupture and the menstrual cycle. Follicular rupture occurs at approximately the mid interval, and corpus luteum rupture during the last half of the cycle.

The clinical manifestations of ovarian perforation may be either sthenic or asthenic, varying with the size of the perforation and the degree of hemorrhage. The most prominent symptom is abdominal pain of sudden onset and variable intensity. The pain is more often localized in the right lower abdomen because of the more frequent involvement of the right ovary. Nausea and vomiting are frequent accompaniments of the abdominal pain.

The advisability of operation depends upon the individual case. If appendicitis or ectopic pregnancy can be definitely excluded from the diagnosis, non-operative treatment may be applicable in many instances of ovarian hemorrhage.

The patients exhibiting signs of marked hemorrhage require immediate operation. If shock is present, supportive measures such as blood transfusion, intravenous infusion of glucose solution, and external heat are necessary. Whenever possible, the bleeding ovary should be conserved. The simplest procedure is to strip the hematoma cavity of its lining and approximate its walls with a fine catgut suture.

EDWARD L. CORNELL, M.D.

Picaud A. Anatomical and Pathogenic Considerations of Ovarian Hemorrhages (*Considérations anatomiques et pathogéniques sur les hémorragies de l'ovaire*) *Gynécologie* 1930 35 402-520

Intra abdominal hemorrhage of ovarian origin has been discussed so frequently in the literature that it is recognized as an important clinical entity in gynecology. While clinical and anatomical investigations have served to establish the clinical picture, the pathogenesis and intimate mechanism of these vascular disturbances of the ovary are still to be determined.

This study of ovarian hemorrhage is based on the histological examination of 106 ovaries. The author distinguishes 6 types of ovarian hemorrhage: intra-follicular, intraluteum, interstitial, intracystic, parietal and multiple. He found the frequency of the types to be as follows: intracystic hemorrhage occurred in 51 per cent of his specimens, intraluteum hemorrhages in 25 per cent, parietal in 15 per cent, intrafollicular in 6 per cent and interstitial in 4 per cent. In more than 25 per cent of the specimens interstitial hemorrhage was associated with other lesions. Multiple hematomas were present in 20 per cent of the cases. Hemorrhage had occurred in about 25 per cent of the ovaries with tumors.

Of the 106 ovaries examined by the author 17 (15 per cent) had ruptured and caused abdominal hemorrhage. The author is of the opinion that this incidence is too low, as many of such accidents are not recognized because operation is not performed. Despite the fact that hemorrhage from follicle cysts is reported frequently in the literature the author has found but few instances of this condition.

There is no organ of the body which normally contains more hemorrhagic areas than the ovary. This is readily understood because the normal ovary undergoes periodic congestion which may readily lead to bleeding. To distinguish between the physiological and pathological congestion and hemorrhage is often difficult or impossible. Many of the hemorrhages are of mere academic interest as they produce no recognizable clinical symptoms. The more extensive may have grave clinical and surgical significance.

A better understanding of the pathogenesis of these hemorrhages has recently been obtained from studies of the ovarian function. The authors describe 3 kinds of factors which may lead to ovarian hemorrhage: general, local, and traumatic.

As general causes of ovarian bleeding the author lists general infection, intoxication, blood dyscrasia associated with endocrine dysfunction and cardiovascular disease. Local factors which may be responsible are ovarian infection, sclerocystic degeneration of the ovary, endometriosis and disease of adjacent organs (salpingitis, myoma, varicocele, retroversion, tuberculosis, tubal pregnancy, appendicitis). The latter are definitely related to ovarian hemorrhage although not always in a cause and effect relationship. Myoma for example may cause hyperemia by pressure and thereby produce

secondary ovarian bleeding. Rupture of the ovary may result from indirect or direct trauma. Indirect factors are defecation, vomiting and coitus. Direct factors which are commonly observed are coitus, vaginal examination, rectal examination, surgical intervention, and accidents.

Hemorrhages from follicular rupture during ovulation and from the corpus luteum (normal and cystic) are also discussed. Bleeding of this type is observed most commonly from four or five days before to four or five days after menstruation depending on the period of ovulation. Ovulation bleeding may merely be an exaggeration of the normal bleeding which occurs whenever the ovum is extruded, namely, a prolonged oozing from the point of rupture or stigma. Bleeding from the corpus luteum (most commonly two days before or after menstruation) may result from vascular lesions of this body. It may form a large resulting clot or expel the lutein lining or it may present the picture of hemorrhage in a coagulated corpus luteum.

Hemorrhages from follicle or corpus luteum cysts (the latter being associated usually with prolonged amenorrhea) are due most probably to excessive activity of the anterior lobe of the hypophysis. Hyperluteinization and hematoma formation in unruptured follicles are similar to the effects produced in animals by the excessive administration of prolan.

The author does not accept the Ogino-Knaus theory of periodic fertility and sterility. Inter-menstrual pain is a most unreliable indicator of ovulation as the vast majority of women do not experience it. When it does occur the author attributes it to abnormal ovulation.

Animal experiments conducted by the author led him to the conclusion that the hormones (almost always the excessive production of prolan) cause the vascular disturbances in the ovary, such as localized hypertension, vasomotor disorders and diapedesis. The presence of other factors which have been mentioned will increase the bleeding when hormonal factors are active.

HAROLD C. MACK, M.D.

## EXTERNAL GENITALIA

Kraas E. Conservative Treatment of Intramural Uterovaginal and Vesicovaginal Fistulas (*Zur konservativen Behandlung der wandständigen Harnleiter und der Blasen Scheidenfisteln*) *Zucker f. Urol.* 1936 30 740

The most common cause of uterovaginal fistula is not injury during labor but uterine necrosis after radical operation for carcinoma of the uterus. The author discusses in detail the diagnosis of uterovaginal fistula which presents no unusual difficulties. The procedure in individual cases is described. If it is possible to introduce a uterine sound up into the renal pelvis the condition is an intramural ureteral fistula. Its prognosis is much more favorable than that of a total fistula, in which condition the urine may be excreted only through the vagina.

The author then discusses in detail the characteristics which are revealed by the roentgen rays which aid in the differentiation between intramural and total ureterovaginal fistula. In place of nephrectomy in the latter type of case, implantation of the ureter into the bladder, or vaginal plastic correction of the fistula, may be done only in rare favorable cases. On the contrary, in intramural fistulas conservative treatment with the ureteral catheter is frequently successful. The introduction of the catheter into the fistulous ureter is frequently difficult. When it has been successfully accomplished the catheter must remain at least twenty-four hours. The author uses the Pflaum rubber catheter, which may be retained without irritation for from three to four days. He saw a severe case of intramural ureterovaginal fistula in which the fistula disappeared completely after one insertion of a ureteral catheter for diagnostic purposes. If the fistula does not close after such treatment the catheter is reintroduced after a rest of twenty-four hours. According to Wertheim spontaneous cure of the fistula results in 50 per cent of the cases. Regular follow-up examinations will aid in avoiding a stricture at the site of the fistula.

The chief cause of vesicovaginal fistula is severe prolonged and artificially terminated labor. The author believes that treatment should be conservative as these fistulas often heal spontaneously. Fine "hair fistulas" can be closed by repeated electrocoagulation, even when of long duration. For this purpose the author prefers the intravesical route. Ottow recommends that the bladder be put at rest by an indwelling catheter. This is not absolutely necessary. Operation for vesicovaginal fistula should be considered only when conservative treatment has not been successful.

(JANSSEN) JACOB E. KLEIN, M.D.

#### MISCELLANEOUS

Mazer, C. and Israel, S. L. The Optimal Dosage of Estrogens. *J. Am. M. Ass.*, 1937, 108: 163.

The authors undertook this study to determine the indications for the clinical use of estrogen, its respective optimal dosage, and the most effective modes of its administration. To determine the rate of absorption and excretion of estrogen 42 hospital patients convalescing from various pelvic operations which included removal of both ovaries were studied. Since the urine content of active estrogen fairly accurately shows the amount present in the circulating blood and since daily tests for estrogen in the blood were obviously impossible the study was based mainly on the entire daily output of urine. Blood studies were made intermittently in every instance and proved corroborative of the urinary changes, with an occasional exception. Only solutions of estradiol benzoate (progynon B), estradiol (progynon DH), theelin (estrone), and theelin (estriol) were administered to the castrated women either hypodermically or orally in doses of from 300 to 50,000 rat

units over periods varying from one to ten days. The products were tested in the authors' laboratory by the Allen Doisy method.

In order to determine the proper interval for the hypodermic use of estrogen, a single dose of from 1,000 to 10,000 rat units was given to 12 surgically castrated women and the entire output of urine was extracted daily for a period of five days. Discounting slight individual variations, a single dose of 1,000 rat units of theelin or estradiol benzoate in oil maintained a normal level of estrogen in the blood, as reflected by the amount excreted in the urine, for a period of four days. Larger doses of from 5,000 to 10,000 rat units produced a temporary hyperestrenia which invariably reached the normal premenstrual level on the fourth or fifth day. The rate of excretion was proportionate with the dose administered and all the demonstrable estrogen was eliminated by the fifth day, irrespective of the size of the dose. This was true also when an adequate quantity of the substance was administered orally as a single dose.

Even 500 rat units administered hypodermically every day produced an abnormally high concentration of the estrogen in the blood, which was reflected by the amount excreted by the kidneys daily.

Twenty-one surgically castrated women were given estrogen orally in doses of from 200 to 6,000 rat units daily in the form of an oily solution on buttered bread. The estrogen was readily absorbed from the gastro-intestinal tract. The degree of absorption, as reflected in the blood and urine varied considerably with the product and the amount administered. The minimum daily oral dose of either theelin or estradiol capable of maintaining a premenstrual level in the blood of the castrated woman was approximately 500 rat units. The claim that estriol is absorbed more readily when administered orally was not supported by this study. It seemed that theelin, originally intended for hypodermic use, was more readily absorbed from the gastro-intestinal tract than either estriol or estradiol.

The hypodermic administration of estrogen in the human being was only twice as effective as oral administration when judged by the rate of absorption and excretion. It varied considerably with the product employed—theelin being most readily absorbed from the gastro-intestinal tract and yielding a ratio of even less than 1 to 2. These observations clearly illustrated the fallacy of broadly interpreting animal experimentation to apply to human beings. In the rhesus monkey, for instance, the ratio between the hypodermic and oral doses of estrogen was 1 to 5. However, the ratio of 1 to 2 did not apply to the treatment of gonorrheal vulvovaginitis in children, in whom an oral dose 5 times the hypodermic was required to produce a comparable clinical effect on the vaginal mucosa.

Therapeutically, estrogen may be administered in various conditions with the following objectives:

1. To overcome uterine hypoplasia resulting from a natural deficiency of estrogen, as seen in most in



stances of amenorrhea hypomenorrhea, dysmenorrhea, and occasionally in the dysfunctional sterility of regularly menstruating women. In order to avoid pituitary inhibition from excessive and prolonged administration, the daily dose should be computed theoretically on the basis of the actual or relative deficiency as indicated by the size of the uterus and hormone content of the blood and urine of the patient.

2 To inhibit one or more of several functions of the anterior pituitary lobe by inducing a constant hyperestrinemia in such conditions as the severe menopausal syndrome, the lobular form of abnormal breast hyperplasia, premenstrual migraine, pituitary hyperthyroidism and selected cases of diabetes mellitus.

3 To produce a purely local growth effect in the vaginal mucosa of children suffering from vulvovaginitis and of postmenopausal women suffering from senile vaginitis.

4 To evoke a pituitary ovarian response in cases of severe amenorrhea by employing massive doses such as 300 000 rat units over a period of one week.

Five patients with primary amenorrhea were given 10 000 rat units of estradiol benzoate hypodermically at intervals of four days for periods varying from two to eight months. Two of the 5 patients menstruated almost cyclically during treatment; the remaining 3 failed to respond even temporarily.

Fifteen patients with secondary amenorrhea were given 10 000 rat units of estradiol benzoate hypodermically at intervals of four days for from two to four months. All but 1 menstruated almost cyclically during the period of treatment. Only 3 or 20 per cent of the group continued to menstruate regularly after withdrawal of treatment for a follow up period averaging one year.

Two of 6 women with hypomenorrhea who had taken from 225 to 1 200 rat units of estradiol daily either in the form of theelol or in its combined form emmenin and 3 of 8 additional patients who had received from 5 000 to 10 000 rat units of estradiol benzoate parenterally at intervals of four days for approximately three months have been menstruating normally during a follow up period averaging fifteen months.

For the relief of primary dysmenorrhea only 1 of 16 patients benefited from the daily administration of 225 rat units of estradiol in a combined form (emmenin) for periods averaging four months. Large doses from 5 000 to 10 000 rat units of estradiol benzoate given hypodermically every fourth day over a period of from three to four months produced no effect in 3 of 13 patients and afforded complete relief during the course of treatments in the remaining 10 patients.

Massive doses of estrogen do not seem to have any deleterious effects on fertility. Four of the patients who had received from 30 000 to 430 000 rat units of estradiol benzoate in the course of from one to two months for the relief of amenorrhea or hypomenorrhea conceived soon after withdrawal of the treat-

ment. Two of the 4 were delivered of healthy offspring; the other 2 have not yet reached the end of pregnancy.

In cases with the severe menopausal syndrome the authors' best results were obtained with the use of 10 000 rat units of estradiol benzoate given hypodermically every fourth day until the major symptoms had subsided. The withdrawal of treatment at this time almost invariably resulted in recurrence of the symptoms. Treatment was the more continued with gradually reduced doses for a period of from four to six months, in order to accustom the economy to function on minimal doses or none at all. Of 51 patients who received the full course of treatment, 20 reported complete relief of symptoms; 12 experienced a return of some symptoms after four or five months; 14 were relieved only during the treatment and the remaining 5 were unrelieved even during the administration of the estradiol benzoate. The associated diabetes mellitus of 3 patients was totally controlled without insulin as long as they received 2 000 or more rat units every fourth day. When they received smaller doses the hyperglycemia and glycosuria reappeared.

The optimal dose and length of treatment of gonorrheal vulvovaginitis is 1 000 or more rat units given hypodermically every other day for a period of not less than eight weeks. CHARLES BAXON, MD.

Gomes M. The Clinical Problem of Endometriosis (O problema clinico da endometriose). *Arch. ginecol. Porto Alegre* 1936 3 1.

An endometrioma is a tumor containing a proliferation of endometrial cells; it may also contain muscle tissue. It may appear after a varying length of time in the scar of laparotomy wounds, especially after gynecological operations. As it may undergo malignant degeneration, its treatment should consist in surgical removal.

The author classifies these tumors according to location as, pelvic, superficial, intestinal, intra-uterine and retrocervical. The intra-uterine form is the most frequent. Each of these tumors is really a miniature ectopic uterus as it shows the menstrual changes of the uterine mucosa. There are 3 tenable theories as to the origin: the serous, the mucous and the heterotopic. The author describes a tumor containing bone tissue which supports the last theory.

As endometriomas may grow from grafts of endometrial tissue transplanted during operations, the author describes a method of preventing their development by the disinfection of the wound in uterine operations with tincture of iodine. The technique of this method is described and illustrated and microphotographs of sections of these tumors are presented. It is probable that bits of tissue transplanted during the operation are activated by the hormones of the corpus luteum and hypophysis and produce these tumors.

The possibility of pelvic endometriosis should always be kept in mind when treatment has no effect on complicated retroflexion, pelvic neuralgia,

oophoritis or functional dysmenorrhea. Fistulas which manifest themselves during the menstrual periods, or tumors in scars that swell and become painful during these periods suggest superficial endometriosis. Progressive constipation and incomplete obstruction of the intestine, particularly if preceded by a history of dysmenorrhea with progressive increase in the intensity of the pain and the number of days of suffering, suggest intestinal endometriosis. Any metrorrhagia which is not caused by a fibroma, hemorrhagic metropathy, abortion, cancer, or parenchymatous metritis should suggest endometriosis of the body of the uterus.

AUDREY GOSS MORGAN, M D

Reiles and Fobe. The Complications of Radium Therapy in Gynecology (*Les complications de la curiathérapie en gynécologie*). *Rev franç de gynéc et d obst*, 1936, 31 921

The use of radium in gynecology may be followed by more or less serious complications (vesicovaginal and rectovaginal fistulas, cystitis, proctitis, vaginal atresia) because of the direct action of the radium or because pre existing inflammation (peritonitis, inflammation of the adnexa, thrombophlebitis and embolism, septicemia) is stirred up by the irradiation. The first group are usually due to improper technique—too large dosage or insufficient screening—and are comparatively rare. The complications due to infection are much more important. The infections are due not only to irradiation but partly also to the manipulation incident to placing the radium. Because of these unfortunate accidents of radium therapy, a number of observers have advocated that measures be employed to combat the local infection and build up the general health before irradiation is begun. Such preliminary procedures such as electrocoagulation of the growth, local application of various dyes or of acetone, administration of auto vaccines, and roentgen irradiation have been suggested. The mortality of irradiation is quoted

10 authors reported a mortality in cases of uterine cancer of from 0.6 to 6.5 per cent.

The statistics of the irradiation complications at the Strasbourg Maternity Hospital are presented. There were 100 cases of cervical cancer, 89 of which were inoperable, 14 cases of fundal cancer, and 100 cases of metrorrhagia due to ovarian dysfunction. For the cases of cancer the irradiation technique of Regaud was followed. For the cases of metrorrhagia varying doses of irradiation (all comparatively small) were given.

Of the 100 cases of cervical cancer, 51 were afebrile after treatment, and 49 were febrile. The most serious complications were as follows: pelvic peritonitis (6 cases), pelvic peritonitis with bilateral phlebitis (1 case), pelvic peritonitis with perforation of a pyosalpinx into the rectum (1 case), inflammation of the adnexa and parametria (1 case), serious hemorrhage due to erosion of a vessel (1 case), and pulmonary embolism (1 case). There were 4 deaths (4 per cent), 2 due to peritonitis, 1 to uremia, and 1 to pulmonary embolism. The cases in which the patient was febrile because of local infection presented a much higher morbidity and mortality than those in which the patient was afebrile.

In the 14 cases of fundal cancer the most notable complication was pulmonary embolism. This occurred 4 times (35.7 per cent), and resulted in 3 deaths (28.5 per cent).

Of the 100 cases of metrorrhagia, 87 ran normal courses. In 3 per cent treatment was interrupted because of fever, and in 2 per cent serious complications, such as pelvic peritonitis, phlebitis, and embolism, occurred. One death was the result of embolism. Nine of the patients, including the 1 who did not survive, gave a history of previous pelvic infection. It is unwise to institute irradiation treatment in the presence of infection.

The authors believe that the morbidity and mortality of irradiation therapy are insufficiently appreciated.

DANIEL G. MORTON, M D

# OBSTETRICS

## PREGNANCY AND ITS COMPLICATIONS

**Picardi M** The Pathogenesis of Premature Separation of the Normally Inserted Placenta with Special Reference to Carbon Disulphide Poisoning (*Sulla patogenesi del distacco intempestivo della placenta normalmente inserita con speciale riguardo alla intossicazione da solfuro di carbonio*) *Ginecologia Torino* 1936 2 1039

Among 30 196 deliveries in the Royal Obstetrical Hospital in Torino in the years from 1923 to 1934 there were 104 cases (0.30 per cent) with premature separation of the normally inserted placenta. The causes were toxemia of pregnancy in 36 cases, short umbilical cord in 8, previous endometritis in 6, chronic nephritis in 4, polyamnio in 4, twins in 3, heart disease in 3, carbon disulphide poisoning in 3 and various other conditions.

The author states that in no instances was external trauma found to be the cause of the premature separation. The separation was the immediate result of apparently 1 of 2 things: a mechanical action, the violent retraction of the uterus in polyamnio after the sudden expulsion of the amniotic fluid, or the histopathological changes in the blood vessels and tissues of the uterus and placenta as in the case of luetic disease (4 cases).

With reference to the group in which the separation was the result of histopathological changes, the author calls attention to carbon disulphide poisoning. His suspicion had been aroused in the case of 4 patients, 1 (a patient of Garfani) who had been working in a rubber factory, and 3 others (the author's) who were engaged in the production of artificial silk. In the 2 industries carbon disulphide is used as a solvent and inhaled by the workers. None of the 4 revealed any pathology in their history or in the course of delivery, but they had been exposed to the dangers of the inhalation of carbon disulphide. It was possible to show definite histological changes in the placental tissues in these cases. The fact that similar cases have not been found in greater numbers, although women are extensively employed in these two industries is due to the improvement in the working conditions. In addition, women are not permitted to work during the last two months of pregnancy.

The author confirmed his observations by exposing pregnant animals to carbon disulphide, the inhalation of which promptly led to premature delivery. The dissection of the uterus and placenta in the animals showed necrotic degenerative and hemorrhagic lesions similar to those found in the placenta of the women who had been exposed to carbon disulphide. Hemorrhage, clot formation and separation of the placenta represent only the final stage of these anatomical changes. The radiographic picture of such a placenta after injection of contrast material into the arteries is very interesting. The separated portion is distinguished by the disappearance of all the fine branches of the arteries (see Fig.).

In the clinical picture hemorrhage, pain and shock are the prevailing symptoms. The prognosis is more serious than in placenta previa. The fetal mortality was 52.8 per cent and the maternal mortality was 6.7 per cent. The immediate danger is decreased in proportion to the delay of the separation of the placenta during the period of labor. However, death may occur late after delivery because of the underlying severe toxemic condition.

In the treatment the prejudices against the administration of pituitrin, ergot and adrenalin to check hemorrhage during labor have been shown to be unfounded. These drugs may be tried at least in mild cases. The obstetrical procedure must be adapted to the case at hand. Surgical intervention is gaining greater favor, especially in the presence of so-called uteroplacental apoplexy. In every case of separation of the placenta, pituitrin should be administered immediately after delivery, even intravenously. In this way atonic bleeding is prevented and what is most important, postpartum hysterectomy may be avoided.

HELENE LIBOWSKI M.D.



Caffier P. The Therapy of Exsanguinated Placenta Previa (Zur Therapie bei ausgebluteter Placenta praevia) *Deutsche med Wchnschr* 1936, 1: 1051

The cooperation of the clinic with the practical obstetrician is especially important in late pregnancy, and when there is hemorrhage during labor. The most important cause of intrapartum hemorrhage is placenta previa. The author reports a case in which the advantages of the cooperation between the practicing physician and the clinic could be readily demonstrated. He then describes the mechanism of the origin of placenta previa hemorrhage.

It is absolutely indispensable to instruct the public, and to obtain the cooperation of the physicians and midwives, with regard to the timely hospitalization of patients with placenta previa hemorrhage. It is a false irresponsible pride that would induce an obstetrician to desire to deliver such a patient in her home. Surgical delivery is the usual treatment in the clinic. The symptomatic therapy possible in private practice compels sacrifice of the child. The procedure to be followed is either the Braxton Hicks version or intra-ovular metureuxis. In lateral and marginal placenta previa a symptomatic procedure, artificial rupture of the amnion, may suffice under certain conditions. However, this procedure should not be adopted for these cases in private practice.

To establish the required definite diagnosis a vaginal examination is necessary, which in placenta previa presents the risk of violent increase of the hemorrhage. In the clinic a vaginal examination is resorted to only when all the preparations for cesarean section are made. In private practice vaginal examination of patients with suspected placenta previa must not be done under any circumstances. Patients with hemorrhage in the second half of pregnancy and during the birth of the child should be referred to the clinic for treatment without exception. Rectal examination offers no solution not because of the danger of infection, but because of the danger of bleeding, the latter risk is the decisive factor against this procedure. Expectant mothers whose confinement is not yet due but who are admitted to the clinic on account of hemorrhage are not examined but closely observed. The examination may provoke a hemorrhage which demands an immediate operation. For the sake of the child such a step should be avoided and the pregnancy should be permitted to proceed to term. Only the vaginal speculum should be used to separate the vulva and vagina in order to inspect the parts and determine the presence of a cancer or any other local cause of the hemorrhage. No pressure nor applications of any kind are permissible. If a patient with suspected placenta previa is permitted to return to her home, she is given specific precautionary instructions, and her blood is grouped before she leaves the clinic.

As a rule the method of choice for delivery is the abdominal transperitoneal cervical cesarean section.

However, if the patient cannot stand a further loss of blood abdominal extirpation of the unopened uterus, according to the Porro method, may be imperative. If still alive, the child can positively be saved by this method.

(SIEDENTOPF) MATTHIAS J. SEIFERT, M.D.

## LABOR AND ITS COMPLICATIONS

Brochier A., and Magnin, P. The Application of Forceps on the After-Coming Head (Les applications de forceps sur la tête derrière) *Reu franç de gynéc et d'obst* 1936, 31: 865

Extraction in breech deliveries may present difficulties when the after coming head is in 1 of 3 positions (1) above the pelvic inlet, because of bony resistance, (2) in the mid pelvis when the cervix encloses the neck, and (3) at the outlet, because of soft tissue dystocia and rigidity of the coccyx.

Extraction of the after coming head with forceps should be attempted only in the last instance. When the head is above the pelvic inlet, forceps application is dangerous to both the mother and baby. Attempts at delivery are dangerous also when the cervix is incompletely dilated. When breech extraction is indicated the cervix should either be dilated manually or enlarged by the Dehriesen incision.

The indications for forceps in the delivery of the after coming head are not fixed. No definite time limit can be set for the application of forceps after manual manipulation has failed. The authors advise almost immediate recourse to forceps especially if fetal distress is evident.

The authors describe the technique of forceps application to the after coming head (1) when the occiput lies beneath the pubes (2) when the occiput lies in the sacral hollow, and (3) when the sagittal suture is transverse or oblique.

The authors report 11 cases of forceps delivery of the after coming head. One of the infants died because of cerebral hemorrhage while another with blood in the spinal fluid, survived. The authors compare these results with those in 9 cases in which delivery was effected by manual manipulation only. In the latter series 4 immediate and 1 late fetal death occurred. Therefore the conclusion is reached that when the head is retarded at the outlet the application of forceps is indicated in nearly every case.

HAROLD C. MACK, M.D.

## MISCELLANEOUS

Maternal Mortality in Boston for the Years 1933, 1934, and 1935. A Study Conducted by the Obstetrical Society of Boston and the Boston Department of Health. *New England J Med*, 1937, 216: 43

A study of the maternal deaths in Boston for the years 1933, 1934, and 1935 was conducted by the Obstetrical Society of Boston and the Boston Department of Health. This study included the deaths of all the patients who were pregnant during the

three year period. In addition to the maternal deaths reported by the Boston Department of Health, a record of 40 more was obtained by the Committee by making a search through the death certificates filed at the state house.

A total of 318 death certificates was studied. Two hundred and eighty four of the cases could be classified under the 10 headings relating to diseases of pregnancy, child birth and the puerperal state which are found in the International List of Causes of Death. The remaining cases terminated fatally from causes in no way related to pregnancy or parturition but were included in order that the study would be as complete as possible.

Twenty one deaths occurred at home, 1 in a doctor's office and the remaining 196 in 30 different hospitals. In the private cases 80 physicians signed the death certificates. The report does not state how many of the deaths occurred in private cases. The deaths occurred in the following cases:

1. Abortion with septic conditions (37 cases). These abortions were apparently all criminal or self induced.

2. Abortion without sepsis (3 cases). One of these cases definitely revealed interference with the pregnancy and the other 2 suggested it.

3. Ectopic gestation with sepsis (5 cases). Delay in diagnosis, delay in operation, ill chosen procedure and poor judgment such as appendectomy and uterine suspension performed at the time of operation for ruptured ectopic pregnancy and the lack of blood transfusion contributed to these deaths.

4. Ectopic pregnancy without sepsis (7 cases). The same factors were present that are enumerated under the previous heading.

5. Placenta previa (9 cases). There were more than 9 cases of placenta previa altogether but this condition was the chief cause of death in only 9 of them. Three of the patients were delivered by manual dilatation of the cervix and extraction of the fetus as soon as they were seen by the physician. Such procedures require no comment. Four deaths followed cesarean section and 1 occurred after Braxton Hicks version and 1 before delivery could be made. Poor judgment and lack of obstetrical skill were the factors responsible for these deaths.

6. Other puerperal hemorrhages (12 cases). Four deaths followed normal delivery, 3 forcep delivery, 4, cesarean section and 1 followed a bag insertion and version. Nine of them occurred after uncontrollable post partum hemorrhage and 2 after accidental

hemorrhage. The type of bleeding was not recorded in 1 case. The absence of blood transfusion in this group is apparent.

7. Puerperal septicemia (74 cases). This group represents 26 per cent of the deaths, and they occurred as follows: after normal delivery (20), after operative delivery—forceps and version—(22), cesarean section—classical (16), low (14)—(30), vaginal cesarean section (1), delivery unrecorded (1). Until the strict routine that is observed in well organized maternities and by trained obstetricians is adopted or enforced generally, infection will continue to exact its toll of lives.

8. Puerperal albuminuria and eclampsia (32 cases). Only 4 of the patients had good prenatal care. Nine died undelivered. One died of post partum eclampsia. Thirteen patients were sent to the hospital in coma or had convulsions before entering the hospital. Lack of adequate care and ignorance on the part of the patient were the big factors in the toxemic group. Poor management of the condition generally was evident.

9. Other toxemias of pregnancy (19 cases). Eight of the patients had had nausea and vomiting, 4 chronic nephritis, 5 toxemia of pregnancy, 1, acute yellow atrophy and 1, hypertension of long standing. Nine died undelivered, 6 in hospitals where therapeutic abortions are not allowed. Death will continue to occur in cases of this kind until the treatment of toxemias is improved and as long as some hospitals forbid therapeutic abortion.

10. Phlegmasia alba dolens, embolism and other conditions (14 cases). Thirty deaths followed some form of operation, 9 occurred after normal delivery. One was due to air embolism during the intravenous administration of glucose and 4 were due to anaphylactic shock apparently following blood transfusion. There were 73 deaths following cesarean section. These were classified according to type, indications and the cause of death. Forty per cent of the deaths in this group were due to sepsis and sixteen and one half per cent were due to embolism.

Thirty four deaths of the 318 were not due to the pregnancy but were included in the series because the women were pregnant.

This study embraces 47,892 births including 1,336 still births. The official death rate per 1,000 was given as 5.6 per cent while the Committee found the rate to be 6.4 per cent. This difference is due to the additional deaths included by the Committee.

CHESTER C. DORRERT, M.D.

# GENITO-URINARY SURGERY

## BLADDER, URETHRA, AND PENIS

Dart, R O The Grading of Epithelial Tumors of the Urinary Bladder A Study of the Cell Types and the Methods of Grading of the Cases in the Carcinoma Registry of the American Urological Association *J Urol*, 1936, 36 651

The grading of 1,224 carcinomas of the urinary bladder in the Carcinoma Registry of the American Urological Association is as follows

Grade 1 Papillary carcinoma All papillary tumors in which there is no clinical evidence of infiltration, and no obvious infiltration of the pedicle or bladder wall can be demonstrated on histopathological examination Most of the cells are typical in appearance and arrangement

Grade 2 (a) Papillary and infiltrating carcinoma Obviously infiltrating papillary tumors and carcinomas in which the papillary structure is recognizable but most of the cells are atypical in appearance and arrangement (b) Infiltrating carcinoma Non-papillary squamous cell carcinomas in which the cells are fairly uniform in size and type or have a tendency to form keratobyalin and epithelial pearls

Grade 3 Non papillary infiltrating carcinomas Very anaplastic infiltrating carcinomas Practically all of the cells are atypical in appearance There is very slight or no differentiation

Although definite judgment concerning the efficiency of grading of bladder tumors will be impossible until more persons with such tumors have been followed for a longer period of time, the author draws the following conclusions

1 It is impracticable to attempt the segregation of bladder tumors into definite groups corresponding to their cell types For all practical purposes, epithelial tumors of the bladder may be classified as (a) papillary, (b) papillary and infiltrating, and (c) infiltrating

2 Carcinomas of the bladder cannot be graded on the basis of cell differentiation alone The mortality of the more differentiated types, such as acanthomas, is practically the same as that of the less differentiated squamous cell tumors

3 The most practical method of grading is based on a combination of physical findings and the findings of histopathological examination

Dart proposes a simplified method of grading  
FLMER HESS, M D

Simpson Smith, A Traumatic Rupture of the Urethra Eight Personal Cases, with a Review of 387 Recorded Ruptures *Brit J Surg*, 1936, 24 309

While the occurrence of traumatic rupture of the urethra may be only 4 cases per 1,400 admissions to hospital, and while the average surgeon may not see more than a single example of such an injury in his

lifetime, familiarity with the management of this condition is desirable for avoidance of the many very troubling complications which follow unwise treatment of the condition The author reports the following 8 cases

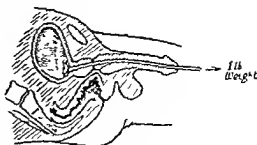
Case 1 While standing on a box, a man seventy years of age fell with his legs astride the edge of the box Immediately after the accident he experienced sharp perineal pain and fainted He was admitted to the hospital half an hour later Examination revealed extensive bruising of the perineum and groins, local tenderness under the pubic arch, and blood dripping from the urethra The patient had an intense desire to void but was unable to pass any urine Immediate suprapubic cystostomy was done with the passage of a rubber catheter down from the bladder to the rupture in the bulb and, after gentle rotation, down to the penile meatus The catheter was left in place for twenty eight days On its removal the patient was able to urinate normally and a No 26 F sound could be passed easily Three days later an abscess in the suprapubic scar necessitated re opening of the latter, but the wound healed again in twenty days The patient was discharged from the hospital three months after his admission When he was re examined two and a half years after the injury he had a good stream on voiding Catheterization or the use of sounds had not been necessary The urethrogram showed slight deformity at the site of the injury but no stricture

Case 2 The patient was a man twenty five years of age who fell heavily, striking his perineum against a table He lay in great pain for about twenty minutes, but was then able to walk alone to the hospital On examination, he had intense perineal pain, and a lump on the right side of the bulbous urethra but no ecchymosis was discovered At immediate operation a catheter was passed into the bladder A slight hitch in its passage occurred at the bulb Suprapubic cystostomy was done, and an indwelling catheter with several perforations for drainage was passed to just below the internal sphincter After the operation the urethra was irrigated daily The catheter was removed at the end of eight weeks The patient then had a small soft stricture This was dilated once a month for eighteen months Two and a half years after the injury the urinary stream was good The urethrogram showed a good wide channel with some irregularity but no stricture in the bulb

Case 3 A boy five years of age was knocked down by a car, the wheel of which passed over his pelvis On his admission to the hospital half an hour later he was in shock and in great pain The lower part of the abdomen was intensely bruised, swollen, rigid, and very tender There was a large gap between the two halves of the symphysis pubis, and blood oozed from the meatus, but there was no perineal hema-



Case 3 Showing the catheters being pulled up through the gap between the two halves of the fractured symphysis pubis



Case 4 Showing the de Pezzer catheter with its circular rubber collar in position after it had been pulled down the urethra by means of the maneuver employed in Case 3

toma. Immediate operation disclosed large blood clots in the abdominal wall. As rapid examination revealed no injury of the abdominal contents, the peritoneal cavity was closed. The bladder was distended and there was a gap of 3 in between the right and left parts of the symphysis. After evacuation of the bladder a catheter was passed in a retrograde direction and another catheter passed up from the meatus to the rent in the urethra. The ends of the catheters were then caught and tied together so that the tubes might be used as a cord to pull an indwelling catheter from the bladder into the torn urethra. The indwelling catheter was left in position until the sixth week. Urethroscopy after seventeen months showed a well defined circular stricture in the membranous portion but a No 6 Fng sound the largest the penis would allow slipped into the bladder without difficulty. When re-examined four years after the injury the patient was perfectly well and experienced no pain or difficulty on urination. The stream was strong and the urine clear.

Case 4. A man forty seven years of age sustained a severe blow on the pubis and penis while unloading logs from a ship to a barge. He experienced severe pain in the tip of the penis and less severe pain in the pelvis. He was unable to arise and was brought to the hospital twenty minutes after the accident. On examination he was in extreme shock and was bleeding from the penis. He had intense pain in the lower part of the abdomen which was rigid and in both legs. There was a large hematoma of the perineum and scrotum. X-ray examination showed fractures of both sides of the pelvis and a fracture dislocation of the sacro iliac joint. A sub umbilical incision revealed a large amount of blood clot and distention of the bladder. A fragment of bone was projecting into the bladder and was causing severe hemorrhage from the vesical venous plexus. After the bleeding points had been controlled the incised viscus was found to contain blood. Catheters were passed rapidly in a retrograde and antegrade direction to the rent in the membranous urethra and their tips seized and tied. Exploration with a finger along the site of the rupture disclosed a long gap between the torn ends traversed by the catheter. The

torn ends were easily replaced by digital pressure on the trigone but the viscus rose again when the finger was removed. An extension catheter was improvised by fitting on the end of a stout Pezzer catheter a flannel sized piece of thick rubber sheeting. Light digital traction on the penis end of this catheter was sufficient to obliterate the gap between the torn ends of the urethra and it was found that the obliteration could be maintained by the use of a 1 lb weight hitched to the catheter and passed over a pulley on the end of the bed. This procedure was well borne by the patient. He stated that he had no discomfort at all in either the penis or the bladder. Convalescence was practically uneventful except for a fistula near the urinary meatus which finally closed. When re-examined eighteen months after the accident the patient was frail walked badly on a crutches and complained of pain in the back and hips. He had a good urinary stream but experienced pain at the end of the penis on voiding and a desire to urinate every five minutes during the day and 3 or 4 times at night. No sound had been used.

Case 5. The patient was a man forty-eight years of age who slipped from his bicycle under a chair and was brought to the hospital in a dazed condition within an hour after the accident. Examination disclosed extreme bruising from above Poupart's ligament down the inner side of the right thigh. There was no perineal tenderness, no blood could be expressed from the urethra and there was no evidence of an intraperitoneal effusion or rupture. Both ischiopubic rami were separated from the symphysis. The urine obtained on catheterization of the bladder was clear and showed only a few microscopic red cells. Two days later the extensive thigh effusion was tapped. The 300 ccm of blood stained fluid evacuated showed an 81 per cent content of urea. Groin drainage was established but nothing more was done. The urethrogram showed a track of lipiodol extending from the membranous urethra into the groin. An indwelling catheter was tried but as it caused the patient great discomfort it was removed. When the patient was re-examined two and a half years after the injury he had no complaint of any kind and the urethrogram was normal.

Case 6 The patient was a man forty two years of age who was lucked on the penis by a horse. When he was admitted to the hospital twenty minutes later he was in extreme shock. The glans penis was swollen to the size of an orange, plum colored, and dripping with blood. The penis showed a T shaped laceration, the horizontal bar of which extended around the corona and partially separated the glans from the penis and the vertical bar completely laid open the distal part of the urethra up to the meatus. The rest of the penis was severely bruised. At immediate operation, the urethra was sutured in 2 layers around a self retaining catheter. All of the sutures held except those near the external meatus. The patient left the hospital on the eighteenth day with the wound healed in the urethra and where the glans had been sewed to the shaft. Examination four years later showed some spraying of the urinary stream.

Case 7 The patient was a man twenty seven years old who, at the age of twelve years had albumin in his urine. Cystoscopy was followed by much urethral bleeding and the development, within the next six months, of a stricture which required repeated dilatations. At the age of fourteen years, soon after being given injections for tuberculous epididymitis, the patient developed water on the right knee. The leg was splinted and soon was well. When he was sixteen years of age the stricture again became troublesome and an abscess which developed at the site of the stricture was opened by a surgeon. At the age of twenty seven he consulted the author for a definitely tuberculous right knee, and for a stricture of the bulbar urethra with a long perineal fistula behind it through which the urine sprayed on urination. As the knee was believed to be of prime importance, he was referred to an orthopedic surgeon. Excision resulted in good stability of the leg. The stricture and the perineal fistula had not been treated at the time of this report.

Case 8 A man forty years of age stated that he had caught his penis on his pajama strings. He was admitted to the hospital an hour later. There was profuse bleeding from the urethra, and a tender spot was found behind the glans. Ice bags and morphine were used and after two days the patient left the hospital. When he was re examined six years later, he was free from symptoms. The diagnosis was rupture of the mucous membrane of the pendulous urethra of doubtful cause.

The author reviews the 381 cases of the urethra reported in the literature, with special regard to the treatment. He says that in all cases success will depend on (1) admission of the patient to the hospital as soon as possible after the accident and before voiding has occurred, (2) a careful toilet of any proposed operative site, particularly of the perineum, penis, and anterior urethra, (3) prompt diversion of the urinary stream by a suprapubic incision made, if necessary under local anesthesia, (4) the retrograde passage of a boiled gum elastic catheter down the urethra to establish the diagnosis of partial or

complete rupture, (5) removal of this catheter from the meatal rather than from the bladder end, (6) wrapping of the penis in a sterile dressing to prevent ascending infection during the healing stage, (7) high blocking of the foot of the bed to drain the urine away from the meatus into the fundus of the bladder, and (8) the use of a suction pump on the suprapubic tube. When there is a dislocation of the prostate or separation of the symphysis pubis, a primary perineal incision may be avoided by the author's method of seizing the ascending catheter from the depths of the suprapubic wound and joining it to the retrograde catheter. This affords a means of pulling down on the bladder and eliminating any gap between the torn ends by applying traction to the retention catheter. In bulbar ruptures the indwelling catheter should be discarded for suprapubic drainage for six weeks. More certain union of the torn fragments is then possible. The freshened ends of the torn ureter should be united by small radial sutures. When the urethra is healed and free from catheter difficulty, the suprapubic wound should be allowed to close. Penile ruptures are rare and usually respond to simple measures. Ruptures of the female urethra must be handled as carefully as bulbar injuries in the male. As the indwelling catheter is not well tolerated, suprapubic cystostomy should be done as soon as possible.

The article is concluded with the following summary:

- 1 Eight cases of traumatic rupture of the urethra treated by the author are reported in detail and 381 cases collected from the literature are reviewed.

- 2 The diagnosis is nearly always easy, and can be made from the history of an "adequate" accident and the simple physical signs. Passing a catheter is a most unreliable diagnostic procedure.

- 3 Difficulty is experienced only in grosser injuries to the pelvis, spine, or rectum as in such injuries the bladder or urethra may also be involved.

- 4 The physical signs of traumatic rupture of the urethra are shock, pain, bleeding from the penis, a perineal hematoma, ecchymosis, and abnormality of urination.

- 5 Stricture formation is more common and serious after traumatic ruptures than after those of any other type. Stricture appears to be as common after membranous as after bulbous injuries.

- 6 Sepsis is suggested as the one cause of stricture formation which can be controlled.

- 7 The various methods of repair have been summarized.

- 8 Treatment as soon as possible after the accident is urged. It should be directed against fouling of the raw area by urine, haphazard catheterization, or perineal contamination.

- 9 Suprapubic deviation of the urine is essential in all ruptures, partial or complete. The only exception is the rare injury to the penile shaft.

- 10 The general belief that an indwelling catheter is well tolerated in cases of posterior or "membranous" rupture and that only a few such ruptures pro-



duce stricture or necessitate perineal exploration was not borne out by the cases reviewed. Immediate perineal incisions are best avoided. A new emergency method of approximating the ends is described. Future treatment may more nearly approach that of injuries of the bulb.

11. Bulbar ruptures are certainly prone to stricture formation. In cases of such lesions a suprapubic cystostomy should be performed at once, but a formal external urethrotomy should be postponed until bruised tissue has recovered. Necrotic tissue is well differentiated and accurate end-to-end suture approximation has a better chance of holding and healing.

12. Penile injuries are less serious and may not require a suprapubic operation.

13. Injuries of the female urethra require immediate diversion of the urinary stream.

CLAUDE D. HOLMES, M.D.

Touraine A. and Solente G. Erythroplakia (L. erythroplasia). *Presse med. Par.* 1936 No. 92 1830

Erythroplakia is a chronic disease characterized by the development and persistence of painless or almost painless red spots accompanied by a slight infiltration of the mucous membrane. It is always located on stratified epithelium and generally on the external genital organs. It develops very slowly and as a rule eventually undergoes malignant degeneration.

It was first described by Fourmer and Daner in 1893 under the name 'benign syphilitic epithelioma of the penis'. In 1911 it was described by Queyrat who called it erythroplakia because of the color of the lesions. At the time of Queyrat's article the condition had been seen only on the glans but since then cases in which it occurred on the vulva have been observed.

Up to April 1936 92 cases had been reported. In the records of 57 the condition was called erythroplakia. In the rest it was designated as Bowen's disease or Paget's disease because of the histological picture. Of 86 patients whose sex was recorded 58 were men. Two thirds of the patients were more than fifty years of age. In 3 cases the condition developed on a scar after traumatism. Syphilis was demonstrated in 57 per cent of the cases and ruled out in 17.8 per cent. Twenty four and five tenths per cent were not sufficiently studied from this point of view. Erythroplakia may be associated with kraurosis or leukoplakia. In some of the cases recorded there was an associated aortitis, tabes or general paralysis. Only 9 cases of involvement of mucous membranes other than those of the genitalia have been reported. In the majority of cases there is only a single patch of erythroplakia but in some there are several. The spots are round or oval and generally sharply circumscribed. As a rule they are on a level with the mucous membrane but sometimes are slightly elevated. They are bright red and have a shiny

appearance. There is only moderate infiltration. The only subjective symptom is occasional slight itching. The adjacent mucous membrane is normal. The regional glands are not enlarged. The development of the condition is very slow. Malignant degeneration may take place within two years but in 1 case reported was delayed for thirty two years.

The diagnosis is not difficult. Late secondary syphilids of the erythematous type may resemble it, but in cases of such lesions there are generally other signs of syphilis and the serological reactions are positive. The syphilids yield to specific treatment while the erythroplakia patches do not. Pagetoid epitheliomas and superficial cancers may be confused with and in fact may be histologically identical with erythroplakia.

Histologically erythroplakia shows in addition to simple hyperplasia, a dyskeratotic metaplasia. The cancers which have their origin from it are of the type of Bowen's cancer or Paget's disease. On account of the danger of malignant degeneration the treatment indicated is removal. Electrocoagulation is the method of choice but if this will involve too much destruction of tissue surgical removal should be done. Electrocoagulation or surgical removal should be done early and thoroughly and the patient then kept under observation on account of the danger of recurrence.

AUDREY GOSS MORDAN, M.D.

## GENITAL ORGANS

Ross J. C. Prostatic Obstruction and Methods of Treatment. *Brit. M. J.*, 1936 2 1297

Ross discusses the methods of treating prostatic obstruction and reviews the results obtained by the various procedures in a series of 120 cases treated during the past two and one half years.

Suprapubic prostatectomy of the Harns type but without primary closure of the bladder was performed in 40 cases and transurethral resection in 32. Ross states that transurethral resection is the operation of choice for bar formation, fibrous prostate, sclerosis of the neck of the bladder and small adenomas of the middle and lateral lobes of the prostate. He prepares the majority of his patients by drainage with an indwelling urethral catheter for ten days. He has found that if the angle formed by the anterior junction of the lateral prostatic lobes is 40 degrees or less any operation short of suprapubic removal of the prostate will probably fail. In the 32 reviewed cases in which the transurethral method was used there were 5 deaths.

FRANK M. COCHENS, M.D.

Cedermark J. Infarction of the Testis. *Acta chirurg. Scand.* 1936 78 447

Infarction of the testis is usually the result of torsion but may be due to other causes.

After reviewing the anatomical relationships of the vessels of the funiculus the author reviews the findings of experimental investigations by various

researchers and the sequelae of operative procedures on these vessels. He concludes that the internal spermatic artery is not to be regarded as an end artery in the sense of Cohnheim. Suspension of the circulation in this vessel usually produces very little or no atrophy. Possibly, however, it may lead to anemic infarction and necrosis of the testis. Interruption of the circulation in the pampiniform veins especially in the lower portion, causes a condition of stasis in the testis which may lead to the type of total hemorrhagic infarction called "coagulative infarct." Cutting off of the circulation in both arteries and veins often, but not always, leads to necrosis in the form of either anemic or hemorrhagic infarction.

Cedermarck emphasizes that in testicular infarction due to torsion the picture of a congestive infarct usually develops, a fact suggesting that the primary factor is interruption of the venous circulation. In discussing the clinical picture, diagnosis and treatment of torsion of the testis he cites illustrative cases coming under his observation.

Testicular infarction due to causes other than torsion is discussed from both the clinical and the pathologic-anatomical viewpoints on the basis of 34 cases collected from the literature and 2 cases coming under the author's observation. Cedermarck concludes that anemic infarction of the testis is rare. It is associated with a thrombosis of the internal spermatic artery. In cases in which it is not produced by torsion or other mechanical factors it can usually be traced to a primary or secondary venous thrombosis in the pampiniform plexus.

In conclusion Cedermarck calls attention to the picture of venous thrombosis in the pampiniform plexus. In discussing the treatment he emphasizes the importance of preserving the testis as long as possible.

Greulich, W. W., and Burford, T. H. Testicular Tumors Associated with Mammary, Prostatic, and Other Changes in Cryptorchid Dogs. *Am J Cancer* 1936, 28: 496.

Cases of cryptorchidism in dogs are seen by breeders only occasionally and are apparently quite infrequent. So far as the authors have been able to determine there is no published report of a testicular tumor in a cryptorchid dog in which the condition was associated with the abnormal enlargement of the mammary papillae, prostatic metaplasia, and other remarkable features found in the dogs he describes in this article.

Dog 1. This dog, a Boston terrier, had been disposed of by its original owner because it seemed to attract other male dogs in much the same way as a bitch in heat. As the mammary papillae were found to be abnormally large the possibility of hermaphroditism was considered. The mammary papillae were as large as those of a lactating bitch though the underlying skin did not have the udder-like appearance it presents in the bitch. The scrotum contained only the left testis. The right testis could not be palpated in either the canal or the tissues of the abdomi-

nal wall. The penis was of normal size and without any externally visible defect. As the authors were interested primarily in finding the missing testis and determining whether any trace of female reproductive organs was present, the dog was killed with ether and the abdomen opened. A tumor replacing the right testis was found immediately caudad to the lower pole of the right kidney, which its superior border slightly overlapped. It measured 48 by 40 by 24 mm and weighed 26 gm. Its surface presented numerous rounded elevations and was covered by a glistening, markedly thickened, and highly vascular fibrous capsule. The right ductus deferens was thicker than the left and followed a rather tortuous course distally, but showed no other gross pathological change. The gubernaculum testis was present as a cord-like structure extending from the lower pole of the tumor to the internal inguinal ring where its fibers fused with the surrounding structures. In stead of shortening normally, this structure had increased in length sufficiently to keep pace with the growing abdomen. The other abdominal viscera were apparently normal. Careful search failed to reveal any trace of ovarian tissue or any abnormally persisting derivatives of the müllerian ducts.

Eight blocks taken from the tumor showed practically the same histological structure. There were a few scattered tubular structures suggesting the original testicular nature of the neoplasm. These were composed of a single layer of cells and were all located in the peripheral portion of the tumor. Blocks from the ductus deferens in the region of the ampulla showed this structure to be lined with a very low type of columnar epithelium in which 2 rows of nuclei were distinguishable. The adrenal gland sections showed the capsule to be thickened and hyaline. Several small adenomas involving principally the zona reticularis were found. Cross section showed the gubernaculum testis to be approximately ovoid and to consist of a wall of fibrous connective tissue surrounding 2 cavities. The latter were separated from each other by an inward extension of the fibrous wall. One of the cavities contained a crescent shaped mass of connective tissue fibers and the other, the remnants of a mass of striated muscle fibers which presumably had originally quite filled it. Within this muscle tissue there were brightly stained eosinophilic areas the appearance of which suggested that the degenerative process had already destroyed a portion of it and was still in process at the time of the animal's death. The scrotal testis showed a very definite increase in the amount of intertubular connective tissue. Study of sections of the scrotal testis showed that spermatogenesis had not progressed beyond the secondary spermatocyte stage. The appearance of the prostate indicated a relatively small amount of secretory tissue or failure of the organ to reach full maturity. Instead of becoming columnar or cuboidal, the epithelium was here of the stratified squamous type. Sections of the mammary papillae showed that some growth of the lactiferous ducts had occurred. In the hypophysis, only a slight

excess of eosinophilic cells in the pars anterior was found

Dog 2 This dog was a wire haired fox terrier two years old which had conspicuously long mammary papillae and appeared to be sexually attractive to males. When the animal was first examined neither testis was in the scrotum but during the examination just prior to operation the left testis descended. As this dog resembled the first dog surgical removal of the offending tumor mass was done to see what effect this would have on the size of the nipples and on the dog's attraction to males. The right gonad was found to be represented by a large tumor which extended across the upper half of the abdomen. Along an area approximately 10 cm in length across the midline at the level of the upper pole of the right kidney it was attached to the dorsal wall. The ductus deferens and vesels led from its lower border down to the region of the prostate. No gubernaculum testis could be found. The tumor weighed 535.6 gm and measured 12.5 by 9.5 by 7.2 mm. Before operation the dog weighed 11 kgm. The tumor resembled very closely the tumor in the first dog. On section a pinkish gray fluid escaped from numerous cavities that were visible on the cut surface. There was considerable resistance to the knife and particles of calcified material were occasionally encountered. The findings of microscopical study of the tumor were very similar to those in the tumor in the first dog. Following the operation the dog lost its attraction for male dogs but the size of the nipples did not decrease. The right adrenal was about 4 times the normal size and showed a decided increase in its medullary portion.

Attempts to demonstrate the presence of an estrogenic substance in the tumors of Dogs 1 and 2 were unsuccessful.

Dog 3 This dog was a ten year-old fox terrier which had been a bilateral cryptorchid since birth. He had been in good health up to two years previously when he developed a swelling in the left inguinal region and his general condition declined steadily. The mass in the left groin was found to be the left testis. The right testis was discovered in a similar position on the right side but was small. As in the case of the other dogs there was some loss of hair on the abdomen and there was pigmentation of the abdominal skin. The tumor in this dog was of the same type as the neoplasms in the 2 other dogs. The prostate was about 3 times the size which is normal for the breed. The adrenal glands were very small. The only change of note which they presented was a relatively large amount of connective tissue in the parenchyma.

The article is concluded with the following summary.

Cryptorchidism in 3 dogs is described. In all of the animals an undescended testis had become transformed into a tumor and there were changes in the mammary glands and in the prostate somewhat similar to those which may be evoked experimentally by the injection of theelin. Two of the animals were

sexually attractive to male dogs and one of them from which the tumor was removed surgically, lost this attractiveness following the operation. In the case of the third dog no information on this point was available. Biological assays of the tumor of the first dog for gonadotropic hormones and of the tumor of the second dog for estrogenic hormones were negative. The negative results are not to be considered as conclusively establishing the absence of these hormones as they may have been due to inadequacy of the extraction methods employed.

In all 3 dogs the hair was sparse and there was increased pigmentation of the skin over the abdomen. The extent of these integumentary changes seemed to be roughly proportional to the severity of the changes observed in the adrenal glands.

CLAUDE D. HOLMES, M.D.

### MISCELLANEOUS

De Hllyès, G. Urogenital Tuberculosis (La tuberculose urogénitale). *J. d'uról. méd. et chir.* 1937; 42: 369.

The author states that urogenital tuberculosis is practically always secondary to tuberculosis elsewhere in the body, usually pulmonary tuberculosis or tuberculous involvement of glands in the alimentary tract. In the urinary tract the primary focus is the kidney. In the genital tract it is generally the prostate. Simultaneous involvement of both the urinary and the genital tract is relatively frequent.

Of all forms of urogenital tuberculosis renal tuberculosis is the most important because it is the most frequent. Of 2,043 cases of suppurative conditions of the kidney in which operation was performed at the author's urological clinic at the University of Budapest, 1,071 were tuberculous. Infection of the kidneys by tubercle bacilli takes place as a rule through the blood stream although the possibility of an ascending infection cannot be absolutely excluded. The question as to whether tubercle bacilli ever appear in the urine unless there is at least an incipient tuberculous lesion in the kidney has not been definitely answered. The author is of the opinion that a clinical diagnosis of renal tuberculosis cannot be made unless pus is present in the urine in addition to tubercle bacilli, this being evidence of an inflammatory reaction caused by the bacilli.

The diagnosis of tuberculosis of the kidney can usually be made in the early stages by ureteral catheterization and careful examination of the urine from each kidney separately for pus and tubercle bacilli. For demonstration of the bacilli Loewenstein's culture method should be employed. Ascending pyelography is rarely necessary and in cases with evidence of tuberculosis should be avoided on account of the danger of pyelonephrosis backflow and spread of the infection. Intravenous pyelography however is of value in the diagnosis of renal tuberculosis.

When the diagnosis of renal tuberculosis has been made definitely, and it has been demonstrated that only one kidney is involved and the other is functioning normally, removal of the diseased kidney is the treatment of choice. In cases of horseshoe kidney the diseased half may be removed as this is practically a separate kidney with its own pelvis, ureter, and blood supply.

In cases of bilateral involvement of the kidneys operation is usually not indicated. The author has tried various methods of non operative treatment, including the administration of tuberculin in small doses, the Gerson diet, Sailer's injections, and the use of Vaudremere's vaccine. Several of these treatments have resulted in improvement of the general condition and in some instances alleviation of the urinary symptoms.

Of 1,358 cases of renal tuberculosis at the author's clinic, the disease was found to be unilateral in 1,250 (92 per cent) and bilateral in 107. In 1 case it occurred in a congenital solitary kidney. Nephrectomy was done in 1,066 of the unilateral cases but in only 4 of the bilateral cases. Of 777 cases in which the removed kidney was examined macroscopically, it showed one or more tuberculous cavities in 471 (59 per cent), tubercles on the surface in 199 (24 per cent), tuberculous ulceration of the papilla in 90, and massive degeneration in 15. There were 34 deaths within three weeks after the operation. Most of the deaths occurring in the first week were due to cardiac failure or cerebral hemorrhage, and most of those occurring in the next two weeks to pneumonia. Six hundred and seventeen of

the patients were followed for from one to fifteen years. Of these, 57 continued to have bladder symptoms for one or more years and 85 died. The chief known causes of death were pulmonary tuberculosis, miliary tuberculosis, and meningitis. Two patients developed tuberculosis in the other kidney, 2 have been constantly ill since the operation, and 2 have tuberculous arthritis. Of 119 living under favorable conditions, 68 per cent are able to work, whereas of 322 living under unfavorable conditions (manual workers), only 25 per cent are well and able to work.

In genital tuberculosis, while the prostate is most frequently involved, the prostatic lesion is rarely the chief cause of the symptoms. In only 36 cases of the author's cases of genital tuberculosis was the prostate the chief site of the infection. In 309 cases the symptoms were referable to involvement of the epididymis and the testicle. Of these, 75 were treated conservatively. Unilateral epididymectomy was done in 129, bilateral epididymectomy in 5, unilateral castration in 92, partial removal of a testicle in 1, unilateral vasectomy in 8, and bilateral vasectomy in 1. There were no postoperative deaths. Of the patients followed up, 12 were well after epididymectomy, 5 after castration, and 2 after vasectomy, 3 were dead, and 9 had tuberculous cystitis. The patients with tuberculosis of the prostate were treated conservatively. One of them who was followed up was found to have chronic fistulas. Of 43 patients operated upon for general urogenital tuberculosis, 117 per cent were living from two to five years after operation. ALICE M. MEYERS

# SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS

## CONDITIONS OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC

Robertson R C Acute Hematogenous Osteomyelitis *J Am M Ass* 1936 107 1193

The findings of a nine year survey of 75 successive cases of acute hematogenous pyogenic osteomyelitis is presented

Although the average number of negroes admitted to the 2 Chattanooga hospitals with which the author is associated represented 17.4 and 26.3 per cent respectively of the total number of patients admitted the incidence of osteomyelitis in negroes was only 6.67 per cent This may indicate a relative immunity of the colored race in the vicinity of Chattanooga

Of the 15 patients whose cases are reviewed 61.3 per cent were males and 72 per cent were between the ages of five and fifteen years A definite predisposing infection was absent in 45.3 per cent of the cases and a history of trauma was lacking in 62.6 per cent Staphylococci were found alone in 60.3 per cent of the wounds and in 24 per cent of the blood cultures In 1 wound they were present in combination with streptococci

The end of twenty two days was chosen arbitrarily as the dividing line between acute and chronic cases Cases of osteomyelitis of the small bones of the hand and foot and of the mandible and definitely chronic cases were excluded from the study The follow up ranged from six months to eight years On the basis of the results the cases are divided into 4 groups

Group 1 was composed of 19 cases without sequestration Pain on firm local pressure was the chief finding in 63.1 per cent of this group and fluctuation occurred in 31.5 per cent Roentgenograms were considered negative in 84.2 per cent The average duration of the symptoms was considerably less than in the other groups (six days) but in infants under two years of age it was nearly one third greater than in any other group Joint infection was evident in 68.4 per cent of the cases although joint cultures were positive in only 46.2 per cent Bone cultures were positive in 83.4 per cent

Group 2 was composed of 6 cases in which small localized sequestra were extruded spontaneously Local pain on pressure and fluctuation were noted less frequently than in Group 1 or Group 3 Early roentgenographic changes were seen in 66.7 per cent of the cases The average duration of symptoms was about twice that in Group 1 being eleven and eight tenths days No evidence of joint infection was noted The average healing time of twelve and five tenths months was approximately 3 or 4 times that in Group 1

Group 3 was composed of 42 cases with sequestration requiring surgery Local pressure pain was

predominant in only 4.7 per cent, but fluctuation was present in 71.4 per cent Roentgenograms were positive in 92.4 per cent The average duration of symptoms was eleven and five tenths days The incidence of joint infection was low (2.3 per cent) but all cultures were positive The healing time was approximately two years Metastatic lesions were most frequent in this group

Group 4 was composed of 8 fatal cases Early roentgenographic changes were noted in 25 per cent The duration of symptoms was about seven days Joint infection occurred in 37.5 per cent in all of which cultures were obtained All patients in this group were white The mortality of females exceeded that of males by more than 50 per cent Blood cultures were positive in 75 per cent of the cases The chief causes of death were bacteremia meningitis, and pneumonia

Drainage was employed 76 times in the 75 cases during the acute stage Soft tissue abscesses when present were drained but the underlying bone was not opened In cases with subperiosteal abscesses the abscesses were incised the underlying cortex was drilled, and a window was removed even though subperiosteal pus was absent In 3 cases subperiosteal exposure under local anesthesia gave no relief but cortical drilling was followed by immediate relief No gross pus was found but cultures were positive in 2 cases Most of the best results as well as the highest mortality occurred when drainage was instituted within a week after the onset of the condition Acute pyogenic, suppurative arthritis was considered to be evidence of osteomyelitis of an adjacent bone until the latter was ruled out Joints are more resistant to infection than bone and apparently possess marked bactericidal properties

Jerome G. Fowler M.D.

Porcher P and Aboulker P The Roentgenography of Gonorrheal Arthritis (La radiographie des arthrites gonococciques) *J de chir* 1936 43 866

This article is based on ten years' experience in the interpretation of roentgenograms of cases of gonorrheal arthritis which were followed for a long time generally from the beginning of the manifestations and controlled bacteriologically

Bone lesions are frequent in gonorrheal arthritis but there are many cases in which the roentgenogram shows only changes in the joint capsule The shadow of the capsule is thickened to 3 or 4 times that of the corresponding capsule on the normal side The thickened capsule may later retract and interfere seriously with the movements of the joint

The joint lesions are of 3 types (1) changes in the width of the space between the bone surfaces (2) changes in the joint outline showing localized subchondral bone lesions and (3) changes in the bone structure properly speaking i.e., diffuse osteoporosis

Generally these 3 types of lesions are associated. The authors present roentgenograms of a number of cases in which they were found.

Widening of the joint interline indicates an effusion but the nature of the latter cannot be determined from the roentgenogram. This widening is not due to purely mechanical factors. It is influenced also by reflex hypotonia of the muscles inflammatory infiltration of the ligaments and possibly a decrease in the tonus of the ligaments. It may threaten the stability of the joint and may be the precursor of dislocation. Narrowing of the interline is a sign of changes in the cartilage. In the beginning it can be detected only by comparison of the involved joint with the corresponding joint on the normal side. For the avoidance of error due to technical causes a careful technique is necessary. Slight narrowing of the interline may be of no significance as it may be caused by pressure on the cartilage, but reduction of the interarticular space to a thin line or its complete disappearance may be a premonitory sign of serious disorders such as ankylosis or dislocation.

The bone lesions are variable. There may be an irregular indentation of the outline of the bone with the jagged edges showing decreased density, or there may be cavities which at first are very small. In fact, the first roentgenograms may show no bone changes at all, and it may be necessary to make a series of roentgenograms to follow up the development of the lesions. Diffuse lesions of osteoporosis may also be seen.

While none of these lesions is pathognomonic of gonorrheal arthritis, a characteristic feature of the condition is the rapidity with which the changes develop. This is true both of destruction and reconstruction of bone as compared with the time of their occurrence in tuberculous and syphilitic arthritis. In gonorrheal arthritis the roentgenogram is of great value in following up the evolution of the disease, determining its seriousness and indicating necessary measures of treatment. No case of gonorrheal arthritis should be treated without following its course roentgenologically. ALFRED GOSWOLD MORGAN, M.D.

Collins D. H. and Cameron C. Multiple Arthritis in Presumably Tuberculous Subjects. Difficulties in Diagnosis and Treatment. *Brit J Surg* 1936, 24, 212.

The diagnosis of tuberculous arthritis is not so easy in adults as it is in children. Smith and Watters found that of 208 cases in which a diagnosis of tuberculosis of the hip was made, the diagnosis was wrong in 22 per cent. On the other hand Milgram found that of 142 cases of proved tuberculosis of bone joints and bursae, the condition had not been diagnosed as such in 38 per cent. The most accurate methods of diagnosis are animal inoculation and biopsy. Biopsy is found to be accurate in about 97 per cent of cases. Roentgen examination is of value in the differential diagnosis only in the comparatively late stages. Allison and Ghormley claim that it is possible for active tuberculosis to be present in

bones and joints without any evidence of it in the roentgen picture. A positive tuberculin reaction can be only presumptive evidence of tuberculosis of bones or joints until all other positive active foci have been excluded, whereas, in the absence of certain modifying factors (overwhelming tuberculous infection, advanced sepsis, anemia, and other grave diseases), a negative reaction can rule out the diagnosis of tuberculosis with some certainty.

The following case reports illustrate some of the factors which account for confusion in the differential diagnosis of multiple arthritis and tuberculosis.

The insidious monarticular onset of multiple non specific arthritis in some cases. A woman had a swelling in the right knee which was diagnosed as tuberculosis and treated by immobilization for three and a half years. Later she had symptoms in the left elbow and wrist which were also attributed to tuberculosis and for which treatment by immobilization was given. The wrist became ankylosed. A year later, after the other joint symptoms had subsided, symptoms similar to those in the other joints developed in the right elbow. Roentgen examination showed slight erosions and loss of cartilage in all joints, bony ankylosis of the left wrist, and secondary osteophyte formation and a periosteal reaction in the right knee and left elbow. Fluid aspirated from the right elbow had no effect when inoculated into guinea pigs. It showed a 90 per cent content of polymorphonuclears, which is similar to the findings in chronic rheumatoid arthritis. In this case the confusion was due to the slow progress of the disease, the positive tuberculin test and the early immobilization. The treatment adopted was detrimental to the functional recovery of the joints, and the patient's economic incapacity was unduly prolonged.

The presence of a visceral tuberculous lesion which may or may not influence the course of a non tuberculous polyarthritis. The authors report 2 cases. One was that of a woman fifty nine years old who had had rheumatoid arthritis for many years and developed pulmonary tuberculosis and the other that of a woman thirty-eight years old who had multiple articular deformities from rheumatoid arthritis, renal and bladder stones, and tuberculosis of the lungs. The occurrence of tuberculous disease and rheumatoid arthritis in the same patient is rare. These 2 cases were the only ones of true rheumatoid arthritis among 1,562 cases of pulmonary tuberculosis in patients over fifteen years of age and among 617 cases of non pulmonary tuberculosis in patients over fifteen years of age who were admitted to the East Fortune Sanatorium, East Lothian, England, in the past thirteen years. In both of them the tuberculosis preceded the rheumatoid arthritis, but it cannot be concluded that the latter was secondary to the former. Of 250 patients with rheumatoid arthritis whose cases were reported by Brav and Hensch, only 8 had tuberculosis elsewhere. It is therefore clear that tuberculosis is of little importance in the etiology of non specific arthritis.

3 The occasional occurrence of tuberculosis of a joint superimposed on a non tuberculous polyarthritis. A girl sixteen years of age who had had non specific multiple arthritis for eight years developed typical tuberculosis of the left knee. The tuberculin test was 3+ and a tuberculous focus was found in the apex of the right lung. Brav and Hench found evidence of tuberculosis of a single joint in 8 of 75 cases in which a pre-operative diagnosis of chronic infective polyarthritis was made. They suggested that tuberculosis of a single joint in chronic infective polyarthritis may develop because of a lowering of the resistance of the involved joint by previous attacks of non tuberculous polyarthritis.

4 The occasional occurrence of tuberculous arthritis in 2 or more joints. Of 168 cases of tuberculous arthritis of the knee Ghormley and Brav found involvement of 2 joints in 13.1 per cent and involvement of more than 2 joints in 5.4 per cent. Of 207 patients with osteo articular tuberculosis admitted to the East Fortune Sanatorium in the last thirteen years at least 7 had multiple foci. It is therefore possible that multiple tuberculous arthritis is not so infrequent as has been supposed.

5 The comparative infrequency of non specific arthritis of the hip before middle age and the tendency to regard the condition in persons under middle age as tuberculous. A girl thirteen and a half years of age was admitted to the East Fortune Sanatorium with a diagnosis of tuberculosis of the left hip. Roentgen examination showed merely loss of bone density and slight narrowing of the joint space but as the Mantoux test was positive the diagnosis of tuberculosis was accepted. Under extension treatment the condition of the hip improved. A year later symptoms developed in the right hip. About three years after the onset, the roentgenogram showed the joint contour to be normal and the diagnosis of tuberculosis was discarded. Recovery resulted under treatment with diathermy, massage and motion. The authors report also 2 other cases of this type and conclude that the treatment was unnecessarily prolonged because of the error in diagnosis.

6 Modification of the course of non specific arthritis due to early immobilization. The following cases suggest that immobilization treatment may prevent or delay certain compensatory structural changes which are usually characteristic of the disease.

A boy eighteen years of age with weakness of the left leg and pain in the left groin was admitted to the hospital with a diagnosis of tuberculosis of the hip. His general condition was poor and a few months later symptoms appeared in the right hip. Both hips were treated by extension. A year after the patient's admission to the hospital the roentgenogram showed involvement of both sacro-iliac joints and both knees in addition to the hips. Later the spine was involved. Biopsy material from the right knee showed degeneration of the synovia, endarteritis and a scattered infiltration of lymphocytes

mononuclears and polymorphonuclears but no giant cells or tubercle bacilli. The Mantoux test was positive. The involved joints became ankylosed.

A man twenty six years of age was treated by immobilization in a plaster jacket and extension on 1 leg for tuberculous arthritis of both sacro-iliac joints. Later both knees became stiff. The final result was ankylosis of the right hip and partial ankylosis of the knees.

7 The possibility that there may be an atypical tuberculous form of polyarthritis—tuberculous rheumatism. In 1899 Poncet described what he called "tuberculous rheumatism," thereby starting a controversy which has continued ever since. In the French literature 2 types are described. One type resembles acute rheumatism without permanent disability. This has been ascribed to a filterable form of the tubercle bacillus or an allergy secondary to visceral tuberculosis. The other type is a chronic polyarthritis which finally becomes localized in 1 joint where the tubercle bacilli can usually be isolated. In the English literature little importance is attached to the condition and the term "tuberculous rheumatism" is seldom employed.

The general conclusions drawn by the authors are that confusion in the diagnosis in such cases is common, and that, whenever there is doubt conservative or expectant treatment should be given and immobilization avoided until definite evidence of tuberculosis is obtained by biopsy or animal inoculation.

WILLIAM ARTHUR CLARK, M.D.

#### Harkins H. N. Hemangioma of a Tendon Sheath Report of a Case with a Study of 24 Cases from the Literature. *Arch Surg* 1937, 34, 22

Hemangioma of a tendon or a tendon sheath is quite rare. In 1913 Weil collected records of 6 cases. In 1930 Burman and Milgram could find records of only 16. 6 of their own and 10 reported previously in the literature. In 1934 Botta and Vicedi raised the total to 19. In this article a case is reported, and with the additional reports that have been collected from the literature the total now amounts to 24 reported cases. (One of Burman's and Milgram's cases is not included.)

On the other hand hemangioma arising in a muscle is much more common. In 1932 Jenkins and Delaney collected 236 such cases, and Nicolas and others have reported similar cases.

A study of the 24 cases of hemangioma of a tendon or a tendon sheath reviewed in the present article reveals that in 19 instances in which the sex was stated there were 12 females and 7 males. The site on which the tumor occurred was stated in 19 instances the left being involved 10 times and the right 8. This does not indicate the marked preponderance of left sided involvement mentioned by Burman and Milgram. The upper extremity was involved 13 times and the lower 7. This is in opposition to the selective localization of hemangioma of the muscle in the lower extremity as noted by Jenkins and Delaney.

The observation of change in the size on elevation and depression of the limb and after application of a constrictor is of importance in the diagnosis. Roentgen examination, as in the case of hemangioma of the muscle, will often reveal multiple calcified phleboliths.

In only one instance phleboliths were not found on x-ray examination. The results of pathological examination as in the case of hemangioma elsewhere in the body, do not always clearly show the predominance of endothelial, of fibrous, or of hemangiomatous involvement. Likewise, the line of demarcation between lymphangioma and hemangioma and also between capillary and cavernous hemangioma must be arbitrary.

Three definite recurrences are mentioned, as well as two instances in which the operative removal was probably not complete. However, surgical treatment seems to be fairly efficacious, although many of the reported cases were not followed long enough to rule out recurrence. NORMAN C. BULLOCK, M.D.

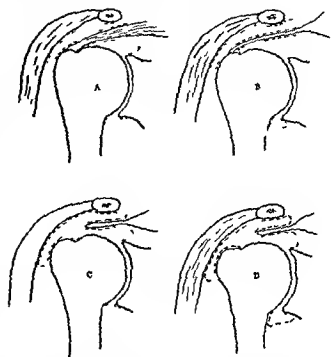
**Skinner, H. A. Anatomical Considerations Relative to Rupture of the Supraspinatus Tendon**  
*J. Bone & Joint Surg.*, 1937, 19, 157

The author believes that rupture of the supraspinatus tendon is very often only an accident in the course of a progressive lesion that is more widespread and involves other structures connected with the shoulder.

The anatomical relations and physiological action of the supraspinatus muscle may produce profound changes in the character of the muscle. An alteration from fleshy fibers in the lateral portion ending in a short tendon to a widespread aponeurosis of fibrous tissue which blends with the infraspinatus may result. Following this alteration other changes frequently occur, i.e., calcification, splitting or rupture of the altered tendon, separation of the aponeurotic sheet from the greater tuberosity and establishment of free communication between the subacromial bursa and the joint cavity. The essential point which the author emphasizes is that the formation of the aponeurotic sheet is a preliminary stage antecedent to separation. Once separation has occurred, the continued action of the supraspinatus will obviously cause the defect to increase and as the synovial lining of the joint cavity and the subacromial bursa come into contact, the pressure effect will soon break down the partition and establish free communication between the joint and bursa.

Associated and subsequent changes occur in the greater tuberosity, the intertubercular sulcus, the articular cartilage, the tendon of the long head of the biceps and the walls of the joint cavity.

It is estimated that about 20 per cent of all adult shoulders show some change in the supraspinatus. Fibrillation and shredding occur at first. About 5 per cent of all adult shoulders show some degree of rupture and splitting. The above condition of the supraspinatus tendon is the most common form of shoulder disability and is frequently not diagnosed.



Diagrammatic drawings representing 4 stages in the development of the condition

- A Normal
- B Aponeurotic sheet fused with capsule
- C Separation of the aponeurotic sheet from the tuberosity
- D Communication established between the joint cavity and the bursa

In the early stages splinting to provide rest for the weakened tendon, is advised. However, no method of local treatment will be completely successful if there is an occupational factor which has been disregarded. Operative repair seems more applicable to acute traumatic rupture of an unpaired tendon than to a chronic condition. Reparative procedures in old cases in which fibrous change in the tendon has been followed by rupture and retraction obviously offer serious difficulties.

Photographs of anatomical specimens, drawings, roentgenograms of a normal shoulder and of two shoulders showing pathological changes are presented.

The reviewer believes that the normal involuntary changes associated with increasing age and hastened by trauma are frequently accompanied by painful symptoms and limited function in the shoulder, and should be borne in mind by the examiner, particularly when surgery is contemplated.

R. P. MONTGOMERY, M.D.

**Smillie, I. S. Mallet Finger** *Brit J Surg.*, 1937, 24, 459

Rupture of the extensor tendon at its insertion into the base of the terminal phalanx is the most common of subcutaneous tendon ruptures. It is produced by the actively contracting tendon being subjected to a sudden passive flexing force or, less



commonly by direct injury on the dorsal aspect of the base of the phalanx.

The injury causes a dull aching pain, the finger is swollen and tender especially on the dorsal aspect of the interphalangeal joint and in complete rupture dorsiflexion is no longer possible.

Smilie divides the cases into 4 types: (1) with incomplete loss of extension caused by partial tear (no roentgenological changes); (2) with complete loss of extension caused by complete tear (no roentgenological changes); (3) with complete loss of extension (with a roentgenologically demonstrable lesion in the form of a chip of bone often triangular from the base of the phalanx) and (4) with separation of the epiphysis at the base of the phalanx (seen in children).

Treatment demands right angle flexion at the proximal interphalangeal joint with hyperextension at the distal interphalangeal joint. For in this position active extension is impossible and the central slip of the tendon is relaxed. To maintain this position the author instructs the patient how to hold the finger. A piece of plaster bandage about 2 ft. long is rolled into a tube so that its inside diameter will roughly fit the finger. The tube is cut longer than the finger and at an angle at one end so it may fit closely at the web. The finger is then inserted into the dry plaster tube and the hand dipped into water momentarily. The finger is squeezed by the surgeon and the patient is instructed to assume the above mentioned position until the plaster dries.

The finger is immobilized not less than five weeks. No estimate of the end result should be made until three weeks of active use of the finger have elapsed.

The prognosis depends on the time which has elapsed following the injury and the age of the patient.

Cases of Type 1 are followed by good results; 3 and 4 by good results but with some residual thickening at the joint. The results in Type 2 vary for there is always the possibility that the torn portion of the tendon has turned into the joint.

Indications for operative treatment are: (1) compound injuries (Type 4); (2) certain fresh cases which belong to Type 2 in which at least a chance of full dorsiflexion is essential; and (3) certain old cases in which the patient demands increased extension.

The operation under local anesthesia is done through an L shaped incision, the short limb crossing the finger transversely. In cases with a torn expansion this is approximated and closed. If suture is impossible the edges are merely approximated and hyperextension maintained. In old cases suture is advised when possible. Otherwise the edges are maintained in apposition by means of hyperextension. The wounds are closed and sealed with a single layer of collodion gauze and the plaster tube is applied while the patient maintains the position of hyperextension of the distal interphalangeal joint.

HARVEY S. ALLEN, M.D.

Compere E. L. and Garrison M. Correlation of Pathological and Roentgenological Findings in Tuberculosis and Pyogenic Infections of the Vertebrae. The Fate of the Intervertebral Disc. *Ann. Surg.* 1935 104 1033.

In pyogenic infections of the spine as in vertebral tuberculosis the primary focus is in the bone and not in the joints. In vertebral tuberculosis, pyogenic vertebral osteomyelitis is commonly a hematogenous infection secondary to a focus of infection elsewhere.

The authors report 9 cases with photopl. roentgenograms, photomicrographs of the specimens removed at autopsy and, in 1 case, the roentgenogram taken two months and three days before death.

A pathological study made in the cases of 4 patients fourteen, six, thirteen and two years of age who were suffering from vertebral tuberculosis complicated by secondary pyogenic infection indicates that the fibrous and cartilaginous portions of the intervertebral discs like the hyaline cartilage of the knee and the hip joints is less readily destroyed by tuberculous exudate than is bone. In 3 cases in which the disease was still active the tuberculous exudate had spread by extension beneath the posterior vertebral ligament about the periphery of the intervertebral disc from body to body, and in 2 posteriorly into the spinal canal.

In 2 cases of pyogenic vertebral osteomyelitis, 16 patients fifty five and fourteen years of age, examination revealed marked destruction of the intervertebral discs and regeneration of bone. In 1 case only slight destruction of the vertebral bodies and an osseous fusion between the 2 involved vertebral bodies were found.

In pyogenic infection of the vertebral bodies, in contrast to tuberculous spondylitis, there is a rapid and early involvement of the intervertebral disc. The cartilage plate is rapidly destroyed by proteolytic enzymes formed in the pyogenic exudate and the nuclear substance is extruded. When the active infection subsides there is regeneration of bone and ankylosis of the vertebral bodies occurs much more commonly and more rapidly than in tuberculosis of the spine.

Secondary pyogenic infection is a frequent complication of tuberculosis of the skeleton when a cold abscess is incised or opens spontaneously on the surface of the body. The pathological changes in the spine from this mixed infection may be typical of tuberculosis of pyogenic osteomyelitis or of both.

In 2 of the 3 cases reported by the authors those of patients seventeen and eight years of age the active infection was manifested by extension of destruction of the fibrous and cartilaginous discs as well as of bone and by new bone formation.

In the case of a five year-old patient with acute vertebral tuberculosis improvement followed a stage spinal fusion and bed rest but about three months later a secondary infection from hemolytic streptococci led to abscess formation and death. The preservation of the intervertebral discs was marked as compared with the amount of

osseous destruction. The pathological and roentgenological pictures indicated that the pyogenic infection was acute and of short duration.

ROBERT P. MONTGOMERY, M.D.

Middleton, D. S. Congenital Disc Shaped Lateral Meniscus with Snapping Knee. *Brit J Surg.* 1936, 24: 246

A disc shaped lateral meniscus is due to persistence of the embryonic form of the cartilage. The first specimen was described in 1889, but it was not until 1910 that this anomaly was found to be responsible for snapping knee. Before 1914 many cases of snapping knee were reported in literature, but the cause was not known. In 1910 Kroiss operated on such a knee and found a disc shaped lateral meniscus. Since then 49 such cases have been reported.

The author reports the following 4 cases which came under his observation in the past two years.

Case 1. A boy eleven years of age experienced sudden pain in the knee while sitting in a chair and swinging his legs. Thereafter the knee was painful for a few days. On examination a sharp click or snapping sensation was noticed on motion just short of full flexion or full extension. Roentgen ray examination was negative. At operation, the lateral meniscus was found to be very broad, filling the entire lateral compartment of the joint, and was split longitudinally. The cartilage was removed. Normal function of the knee was recovered.

Case 2. A boy thirteen years of age had noted a cracking sound in the knee all his life. Examination showed that movement of the knee was free and smooth up to 20 degrees from full extension, at which point a dull, cracking noise was heard. At operation, a disc shaped lateral meniscus was found covering the entire lateral condyle of the tibia except for a notch on the inner margin. Its femoral surface was divided into 2 facets by a transverse ridge. As the knee was extended the femoral condyle could be seen to slip over this ridge from the posterior to the anterior facet. After complete removal of the cartilage the joint was normal.

Case 3. The patient was a boy thirteen years of age whose knee had made a snapping noise ever since he was four years old. The lateral meniscus was found to be quadrilateral in shape, with a notch on the mesial border and an oblique ridge on the superior surface. After removal of the cartilage the symptoms disappeared.

Case 4. A girl eighteen years of age had a snapping sensation in her knee but no disability. On examination, a typical "clunking" noise could be heard near complete flexion or extension. Operation disclosed a typical disc shaped external cartilage. The anterior part of the cartilage blended with the intercondylar structures. Its upper surface was smooth. The snap was found to occur when the femoral condyle slipped over the anterior margin of the cartilage on complete extension.

A disc shaped meniscus is more susceptible to injury than a normal meniscus. In some cases there

is a history of heredity. In many cases there are no symptoms. The snap may be due to a transverse ridge over which the femoral condyle slips, or to an abnormally loose cartilage which slips backward on extension and forward on flexion.

In young children the symptoms may disappear spontaneously, but in older persons removal of the meniscus is necessary when symptoms persist. The resection can be done through the usual incision at the side of the knee. It is wise to flex the knee fully to bring the cartilage into its anterior position where it will be more readily accessible.

WILLIAM ARTHUR CLARK, M.D.

Blount, W. P. Tibia Vara, Osteochondrosis Deformans Tibiae. *J Bone & Joint Surg.* 1937, 19: 1

The author presents 13 new cases of osteochondrosis similar to coxa plana but located at the medial side of the proximal tibial epiphysis. He also reviews 15 from the literature. Those in the literature were variously designated as rickets, chondrodysplasia, growth disturbance, unusual epiphyseal change, epiphyseal defect, osteitis of the upper end of the tibia and epiphysitis tibiae deformans of Luelsdorf.

The condition is not an inflammation and the suffix "itis" is misleading. It is not limited to the epiphysis, but is an abnormality of growth of the metaphysis, epiphyseal cartilage and osseous center of the epiphysis. Any name should imply the involvement of both cartilage and bone. The cases presented are similar to the other osteochondro-trophopathies. This term is accurately descriptive of the lesion but it is too unwieldy for ordinary use.

"Osteochondrosis deformans tibiae" has been used by the author. Luelsdorf's "deformans" has been retained to differentiate this lesion from Osgood Schlatter disease in which there is no gross alteration of form. "Tibia vara" is a satisfactory anatomical designation, in keeping with the terms coxa plana and genu varum.

The deformity is an abrupt angulation of the tibia with the apex laterally just distal to the knee joint. Some other associated findings are internal rotation of the tibia, recurvatum, abnormal medial mobility, tibial shortening, and a bulbous enlargement of the medial condyle. In the unilateral cases the deformity causes a limp and in cases of bilateral involvement there is a waddle.

Roentgenographically there is an abrupt angulation just below the proximal tibial epiphysis, and the epiphyseal line may be irregular and expanded medially. There is a beak like medial enlargement of the tibial metaphysis in which areas of rarefaction may occur. These are cartilaginous islands, and the medially projecting metaphysis is covered by hyaline cartilage. The epiphysis frequently is wedge shaped, being narrowed medially. In the cases occurring in infancy the roentgenographic findings resemble a dysplasia, and in the cases occurring just before puberty an arrest of the epiphyseal growth, rather than a dysplasia, is present.

Pathologically the changes consist essentially in faulty growth of the epiphyseal cartilage and delayed ossification of the medial portion of the proximal tibial epiphysis. A beak-like projection of the metaphysis forms secondarily as a buttress under the epiphysis. It is covered by, and includes islands of hyaline cartilage. The cells are irregular in distribution rather than columnar as seen in normal epiphyses. The general appearance closely resembles a localized chondrodysplasia.

The treatment should be directed toward the mechanical relief of strain until the deformity is stationary or until the epiphysis is closed. A simple osteotomy with emphasis placed on overcorrection of the deformity is desirable in the treatment of marked deformities. If this is done before the amount of angulation has become stationary, some degree of recurrence may be anticipated. Closure of the epiphyses may be indicated in some cases.

Two types of tibia vara are discussed. The infantile type appears during the first or second year and the adolescent type may occur just before puberty. The radiographic findings of the infantile type gradually change to those of the adolescent so that the two can be distinguished later only by the history.

Four cases of infantile tibia vara and 3 cases of adolescent tibia vara are presented in detail along with pre-operative and post-operative photographs, roentgenograms and 2 photomicrographs of a biopsy specimen.

Summary charts of the previously unpublished cases and of the cases taken from the literature are included.

Röntgen tracings of the 36 cases presented in the paper are grouped according to the roentgenographic similarity, showing different phases in the 2 types of tibia vara. Tracings of miscellaneous cases reported elsewhere but differing from tibia vara are included.

The author suggests a simplified, more inclusive and accurate terminology for the described condition which is not so uncommon as the scant attention it has received indicates.

Fifty one references are listed.

ROBERT F. MONTGOMERY, M.D.

## SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Kábalová Džottiová V. The Late Results of Secondary Plastic Operations on the Tendons and Nerves of the Hand in the Twelve Years Since the Establishment of the Clinic of Petrvalský (Die Späterfolge der sekundären plastischen Operationen der Handschellen und Nerven während des zwölfjährigen Bestandes der Klinik). Bratislava lek. Listy 1936 16 162.

In the clinic of Petrvalský in the period from December 1923 to November 1934, 7,510 injuries of the hand were treated. Of these 6,900 were treated in the out patient department. During the same period 18 patients were accepted by the clinic

for secondary plastic operations on tendons and nerves of the hand. The author reports the end results of the operations the first of which was performed twelve years ago and the most recent of which was performed two and one half years ago. At the time of their discharge from the hospital 7 of the 18 patients were regarded as cured, 10 had been benefited, and 1 had not been benefited. In January 1935 by questionnaire or re-examination at the clinic the following facts were determined:

Of the 18 patients who were heard from or re-examined, only 2 (11.18 per cent) had an entirely satisfactory end result. Two showed considerable improvement 3 (17.27 per cent) only minor improvement and 4 (33.36 per cent) no improvement.

All of the patients were engaged in manual labor. Fifteen were men. In 14 cases the hand condition was the direct result of an injury (glass bullet knife horse-chite electric current). In 2 there was a bilateral congenital contracture and in 2, paralysis due to anterior poliomyelitis. In 4 cases primary suture of the deep structures had been undertaken and in 4 the general practitioner had done a primary suture of the skin. In all, smooth healing had occurred.

In 4 of the cases in which suturing had not been done the injury was followed by a secondary plegmon. In 12 cases there was incidental involvement of nerves and tendons in 3, involvement of only the tendons and in 3 involvement of only the nerves.

The author discusses simple tendon suture elongation of the flexor tendons transplantation of tendons tenodesis resection of a neuroma of the median nerve and suture of the main stem of the median and ulnar nerves.

He states that the fate of the injured person lies in large measure in the hands of the physician who first treats the injury or the inflammatory complications. After primary care of the wound operation should be performed before severe secondary atrophies contractures and ankyloses develop as by this means the incidence of permanent disability is reduced and the prospect of successful results from secondary tendon or nerve suture is increased. Injuries to the nerves particularly the median nerve are frequently overlooked. Inability to oppose the thumb is an indication for a secondary operation. Severing of the flexors at the level of the wrist joint is almost impossible without incidental injury of the median nerve.

(ISSIGLER) JOHN W. BROWN, M.D.

Calvet, J. The Value of Arthrodesis of the Knee in the Treatment of White Swelling of the Knee of the Child and the Adolescent (Valeur de l'arthrodèse du genou dans le traitement de la tumeur blanche du genou de l'enfant et de l'adolescent). J. de chir., 1936 43 646.

The author reviews the history of the treatment of tuberculosis of the knee joint in children and adolescents. Operation was first suggested by Olier

but because of a lack of sufficient knowledge and care, it sometimes failed, and as the advantages of immobilization and heliotherapy became better known there was a tendency to reject operation entirely and to consider it useless or even dangerous. In recent years, however, the use of operative methods has been revived. The operative techniques are almost as numerous as the surgeons using them, but many of the variations are mere details, and the principles of all methods are essentially the same.

The author recommends 2 operative methods. One is intra epiphyseal grafting which is a modification of Ollier's original method. This yields excellent results in patients more than fourteen years of age by bringing about complete fixation of the joint. No shortening occurs as it does not injure the cartilage. Under roentgen control a graft from the tibia is passed between the 2 epiphyses. An opening is made for it with a perforator, and the graft is driven in with a hammer. The placing of the graft is shown by illustrations. To keep the joint in position a plaster cast is applied. Later, heliotherapy is given through a posterior valve.

The transarticular graft activates repair of the lesions, fixes the epiphyses solidly, supplies calcium, and acts as a guide to reparative calcification. There is very little shock, no unnecessary injury of the soft parts and little deformity of the joint. However the epiphyses must be large enough for all of the surfaces of the graft to remain in intimate contact with the host, and ossification must be advanced to a point which eliminates danger of pseudarthrosis. Therefore the operation is unsuitable for children less than six years of age. It is contra indicated also in cases of very destructive lesions and cases in which there is a tendency toward a vicious attitude in flexion. When indicated, it gives excellent results in cases in which the lesion is near the end of its clinical development and not very fungous, those in which some degree of mobility has persisted, and those in which there are no vicious attitudes. The author has never seen poor toleration of the graft. The only failures are due to absorption of the middle part of the graft where it crosses the interline. Calvet has had only 2 failures in 17 cases treated by this method.

The other method he recommends is extra articular grafting. In this procedure the upper end of a long graft from the tibia is fixed in the diaphysis of the femur after division of the quadriceps, and the lower end fixed into the antero internal surface of the tibia near its anterior border. The middle part passes through the patella. The operation is shown by illustrations. This method is useful in the cases of children from eight to fourteen years of age, cases of lesions of long duration which remain rather fungous after they should have become dry, cases of recurrence in which an intra articular operation would be dangerous on account of the possibility of lighting up an active focus, and cases in which there has been extensive destruction of the epiphyses. It is of most value in cases with irreducible deviations

as the flying buttress of the graft prevents deformity. Possible poor results are pseudarthrosis and fracture of the graft. Occasionally also the limb of the young child may grow out of proportion to the length of the graft and thus cause deviation. However, of 17 cases in which this method was used, deviation occurred in only 2.

The success of both of these types of operation for tuberculosis of the knee joint is dependent to a great extent on the postoperative care. Moreover, the younger the child the less the chance of success. In the cases of adolescents the results are apt to be very successful. Absolute immobilization is necessary for six months, and careful observation for a year. For still another year the patient should wear a protecting band around the knee when he is walking.

These operations bring about a solid ankylosis of the joint. However, it is not to be expected that they will accomplish as much as resection in the adult. In the cases of children more care is necessary in the selection of the type of operation and the time for operating than in the cases of adults. The age of the child and all of the circumstances must be given careful consideration. Unless this is done the prognosis of tuberculous arthritis of the knee joint will be rendered worse rather than better by operation.

AUDREY GOSWORTHY M.D.

## FRACTURES AND DISLOCATIONS

Davis, A. G. A Conservative Treatment for Habitual Dislocations of the Shoulder. *J Am M* 121, 1936, 107-1012.

The author describes a method for the conservative treatment of habitual dislocation of the shoulder and reports 8 cases in which it was used. In this procedure the shoulder is strapped with ordinary adhesive tape in such a way that the arm is prevented from moving backward to the coronal plane and the elbow is held adducted inside the lateral sagittal plane. The patient is then instructed in a definite technique of muscle development for several weeks. At the end of two weeks, the adhesive strapping is removed and the muscle re-education continued a month longer.

The purpose of the conservative approach is to fortify the anterior aspect of the joint. The treatment described eliminated the necessity for operative measures in 75 per cent of a consecutive series of typical recurrent dislocations.

PAUL C. COLONNA M.D.

Boehler, L. Principles of Treatment of Clavicular and Vertebral Fractures (Grundsatzliches zur Behandlung von Schlüsselbeinbruechen und Wirbelbruechen). *Monatsschr f Unfallheilk*, 1936, 43, 337.

The 3 principles of fracture treatment are summarized by Boehler as follows:

1. The displaced bone ends must be satisfactorily replaced.

2 The reduced fragments must be maintained in good position constantly until they are joined by bony union.

3 During the period of immobilization of the reduced fragments as many as possible or all, of the joints and the entire body must be moved actively through their full range within pain limits to prevent any disturbance of the circulation atrophy of the muscles and bones and stiffening of the joints.

Boehler then compares his results in 13 cases with the results obtained by Magnus. Magnus treats fractures of the clavicle with extension apparatus. Boehler has found that the use of a splint gives better functional and cosmetic results. In Boehler's cases compensation is terminated in one and one half years and in Magnus' cases in three years.

In vertebral fractures which Magnus treats chiefly by six weeks of recumbency on the back without reduction Boehler has found that immediate reduction followed by the application of a plaster corset gives better results in simple as well as serious cases. The healing period in cases treated by Boehler's method ranges from six weeks to six months and averages three months. Boehler attempts to prove by illustrative cases and by statistics that his treatment is not expensive time consuming or trouble some to the patient. After reduction and the application of the plaster corset he prescribes active exercise without canes crutches or walkers. Therefore the patient's family obtains the full sick pay earlier. This is less than the cost of hospitalization. The earlier and greater activity improves the patient's morale and decreases his desire for compensation. Boehler believes that insurance carriers will soon request his treatment. Kyphosis must be prevented if possible not only for esthetic reasons but also because it decreases the patient's capacity for work.

In conclusion Boehler cites a case which he believes demonstrates the value of immediate reduction and corset treatment especially well. The patient was a girl ski jumper with paralysis of the sphincter and partial paralysis of the legs due to a rotation fracture of the third lumbar vertebra. Six hours after reduction of the fracture which was done the day after the fall the paralysis was diminished. After four days the patient was able to stand and after fourteen days she was able to perform all exercises and to carry 10 kgm. on her head.

BARBARA B. STIMSON, M.D.

Snellman A. Uncomplicated Fractures of the First Metacarpal Bone (Über unkomplizierte Brüche des Os metacarpale I). *Acta Soc. Med. Fennicae Helsing.* 1936, 22 Fasc. 1 No. 1.

From the Hospital of the Finnish Red Cross and the Surgical University Clinic of Helsingfors the author presents a study of 54 cases of uncomplicated fractures of the first metacarpal bone. Of these 34 were through the base 7 through the diaphysis and 3 through the head. In the basal group 8 were oblique 7 were above the epiphyseal line in children 12 were intra articular and 17 were of the Bennett type. The author discusses the mechanism of the injury with the hand in radial deviation, in ulnar deviation or in the mid position. He states that fractures with gross deformity should be reduced and then maintained in position by the unpadded plaster gauntlet as described by Boehler with the thumb in abduction. When the displacement is negligible or absent an elastic bandage of some type is all that is necessary. He does not believe that metal splints are satisfactory for maintaining reduction. Although he cites no cases he believes that traction combined with the plaster gauntlet may be necessary in certain difficult fractures of the Bennett type. The article is illustrated by drawings and photographs.

BARBARA B. STIMSON, M.D.

# SURGERY OF THE BLOOD AND LYMPH SYSTEMS

## BLOOD VESSELS

Hunt, J. H. Raynaud's Phenomenon in Workmen Using Vibrating Instruments *Proc Roy Soc Med, Lond., 1936, 30, 172*

In a preliminary communication, the author presents conclusions made from studies of individuals suffering from Raynaud's phenomenon, all of whom had used pneumatic instruments. He states that while Raynaud in his time did not observe such symptoms after the use of vibrating instruments, yet for the past thirty years such intermittent attacks of pallor or cyanosis of the fingers have been found to occur in men working with pneumatic chisels, hammers, riveters, or road drills, and also in shoemakers using pounding and lasting machines.

In the report reviewed herein, the author presents a recent study of a group of 7 riveters from a locomotive workshop. The symptoms of these men corresponded closely with those complained of by men working with pneumatic tools in other parts of the world. The hardness and unyielding nature of cold rivets, which were used by this group, are partly responsible for this phenomenon. Untoward symptoms do not develop among riveters using hot rivets which are easier to work with than cold rivets.

The disturbance in the circulation of the fingers first manifested itself when the men had been working with cold rivets for two years or more. The attacks of Raynaud's phenomenon appeared only occasionally and in winter at first, but later they occurred more and more frequently and even in summer. The symptoms varied from a slight pallor of one finger tip to cyanosis and numbness of all the fingers of both hands. If the cyanosis lasted for more than one half hour the skin of the finger tips became quite insensible and on cold mornings special difficulty was experienced in holding a razor and in carrying out other finer movements. If a finger was cut during an attack it did not bleed, and the attack lasted as long as the hand and body remained cold. When warmth was applied the fingers rapidly recovered their normal color. While in many instances the symptoms led to no more than an inconvenience yet some of the patients complained bitterly of their symptoms. Emotion seemed to have no predisposing effect in these attacks and there was no evidence that vibration by itself, without the cold, could precipitate an attack. The riveting machine observed by the author was usually cold, cold air blew from the exhaust onto the hands and body of the workmen, and it was the coldness of this air which brought on the attacks that occurred while at work.

The author describes in detail the phases of the typical Raynaud's phenomenon observed in this group of riveters. When the patient was cold the cyanosis passed through various depths of colors

It always started at the finger tips and spread proximally up to the base of the fingers perhaps to the palms. If the attack persisted for a long time, a secondary waxy pallor replaced the cyanosis. The hands stayed blue or pale until they were warmed, and when they were warmed, irregular red blotches appeared. These blotches gradually coalesced until the whole dorsum of the hand or palm was fiery red or scarlet. While severe pain was rare, every patient complained that his fingers felt numb at the onset of an attack. During the phase of recovery the men complained of burning and tingling. All the men stated that their fingers felt cold to the touch during the attacks. Sweating of the bands and of the skin of the fingers did not occur.

When these men stopped rivet work their symptoms sometimes improved but they did not disappear, therefore, the prognosis is usually poor. The best treatment for men who have developed Raynaud's phenomenon in their fingers is always to keep their body and hands warm, particularly in the morning. In elderly men with nutritional changes, sympathetic ganglionectomy or section of the sympathetic trunk may have to be considered.

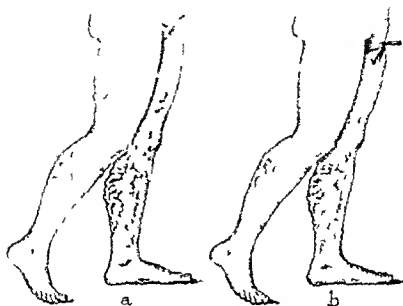
The author presents suggestions for several methods of preventing these circulatory disturbances in men using cold riveting machines. The rate of vibration of the instrument might be reduced below a critical level. Shock absorbing pads might be incorporated in the palms of the leather gauntlets which these riveters wear. A baffle with a strong spring to absorb part of the shock of the vibration might be devised for the machine. Inasmuch as these disturbances do not appear until a man has worked for two years or longer, they might be avoided by arranging shifts so that no man works at this particular type of riveting for more than a few months at a time.

HERBERT F. THURSTON, M.D.

Mahorner, H. R., and Ochsner, A. A New Test for Evaluating Circulation in the Venous System of the Lower Extremity Affected by Varicosities *Arch Surg., 1936, 33, 479*

Forty five years ago Trendelenburg described the phenomenon of retrograde flow of blood in the saphenous vein in cases in which the valves are incompetent. Numerous methods have been advocated for treating varicosities of the lower extremity, but so far none has proved entirely satisfactory. As the factors active in varicose veins are variable, different methods of treatment are advisable for different degrees and types of varicosities.

In the Department of Surgery at Tulane University of the Louisiana School of Medicine every patient coming for treatment of varicose veins is subjected to an examination which includes several tests to determine the circulation in the varicosities. The routine tests are the Trendelenburg test with



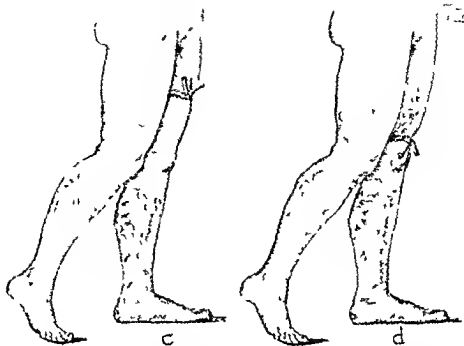
its singly or doubly positive response Perthes' test and a test in which the patient is made to walk with a spiral bandage compressing the superficial veins in order to determine whether cramping which indicates that the communicating veins or deep veins are not patent will occur under such pressure.

The authors describe a new test which reveals not only incompetency of the valves of the internal saphenous vein but also incompetency of the valves of veins communicating between the superficial and deep systems of veins. It locates the level of the leaks between the deep and superficial systems and aids in planning the treatment and determining the danger of recurrence. It is made as follows:

The patient having disrobed sufficiently to expose the thighs and legs, the degree of prominence of the varicose veins when he stands is noted by a seated observer. It is essential for the observer to have a good light behind him which is directed toward the area of the room immediately in front of him. It is important also for him to be seated on a low chair or stool so that his horizontal plane of vision will be not much higher than the hips of the patient and he will have a good view of the patient's lower extremities. The patient walks to and fro in front of the observer who carefully notes any changes in the size of the veins as compared with their size in the standing position (Fig. a). As the patient walks the veins usually become less prominent because of an efficient pumping action by the muscles on the deep veins. After he has passed in review several times in this fashion a tourniquet of thin rubber tubing is tied around the upper third of the thigh sufficiently tightly to compress the superficial veins (Fig. b). The patient then walks at the same rate of speed over the same course as before and the ob-

server notes the relative size of the veins as compared with their size when he walked without the tourniquet. As a rule the prominence of the varicosities is reduced from 50 to 75 per cent of their prominence when he walks without a tourniquet. The reduction is due to the fact that the circulation in the superficial system at the level of the tourniquet is inhibited and the blood cannot flow backward from the femoral vein through the long saphenous vein past this level. The action of the muscles on the deep veins in walking pumps the blood more efficiently toward the heart. It milks the superficial system free from its contents below the tourniquet, with the result that the veins become less prominent on the surface. On its removal from the upper third of the thigh the tourniquet is applied at the middle third sufficiently tightly to obstruct the flow of blood in the superficial veins (Fig. c). The patient then walks again and the prominence of the veins in the legs is compared with their appearance when he walked without the tourniquet and with the tourniquet applied around the upper third of the thigh. Similarly the patient walks with the tourniquet around the lower third of the thigh (Fig. d). Frequently it is observed that when the improvement in appearance is only moderate with the tourniquet around the upper third of the thigh it is marked when the tourniquet is around the lower third.

Thus the veins of the leg are observed with the patient under 5 conditions: (1) standing still; (2) walking without a tourniquet; (3) walking with the tourniquet applied around the upper third of the thigh; (4) walking with the tourniquet applied around the middle third of the thigh; and (5) walking with the tourniquet applied around the lower third of the thigh.



In 40 per cent of cases improvement is greatest when the patient walks with the tourniquet around the lower third of the thigh. When the tourniquet is around the middle or the upper third of the thigh it is less marked, but even then is more marked than when the patient walks without a tourniquet. The most frequent finding is that there is no difference in the size of the veins when the tourniquet is in any one of the 3 positions, yet there is definitely more improvement when the tourniquet is around the thigh than when it is not. The least frequent finding is that there is no improvement with the tourniquet or that the veins are more prominent when the tourniquet is around the thigh than when it is not.

In cases in which the greatest improvement is seen when the tourniquet is around the lower third of the thigh some variable must account for the fact that the improvement is greater under these conditions than when the tourniquet is around the upper third of the thigh. This further improvement indicates not only that the retrograde flow through the saphenous vein comes through the main opening into the femoral vein, but also that below the highest application of the tourniquet there is a backward flow which is caught when the tourniquet is moved lower. This backward flow is undoubtedly through incompetent communicating veins between the superficial and the deep system of the thigh.

In cases in which the test shows the greatest improvement when the tourniquet is around the lowest third of the thigh the authors ligate high to prevent recurrence, inject a sclerosing solution into the distal segment at the time of the ligation, and subsequently ligate lower to obtain the benefit of complete interruption of the flow in the long saphenous vein, even of that through incompetent com-

municating veins below the main opening of the saphenous into the femoral vein.

In the cases in which the test shows as great improvement when the tourniquet is high as when it is low they merely ligate and section the internal saphenous at its upper end and inject a sclerosing solution into the distal stem.

In conclusion the authors make the statement that they are convinced of the value of the following observations:

1. If the described test shows that the communicating veins between the superficial and the deep system are markedly incompetent and high ligation is done, the patient is benefited somewhat, but little more than when a sclerosing solution is injected into the veins of the calf without ligation.

In cases in which this condition exists, low ligation gives by far the greatest immediate improvement. Since, as many authorities maintain, fewer recurrences through collateral veins follow high ligation, high ligation should be done, and, in addition to this procedure, low ligation may be done for the optimum effect and to prevent recurrence through communicating veins.

Westerborn, A. Fatal Pulmonary Embolism in Sweden Following the Injection Treatment of Varicose Veins (Das Resultat der Nachuntersuchungen der in Schweden tödlich verlaufenen Lungenemboliefälle nach Injektionsbehandlung mit Variceen). *Zentralbl. f. Chir.*, 1936, p. 2011.

Westerborn found that among 30,000 cases of varicose veins which were treated by injection, death occurred in 11 and severe pulmonary embolism with recovery in 5. This mortality rate (0.037 per cent) is higher than that given in the literature.



Quinine urethane is used chiefly for varicose in-  
jections in Sweden and was responsible for most of  
the embolisms which were observed (13 of the 16).  
Embolism occurred after the injection of sodium  
salicylate in 2 cases and after the injection of glucose  
solution in 1 case. Elderly persons were affected  
most.

About 100 cases were treated by high ligation  
of the saphenous vein and injection. In this group  
there were 4 embolisms and a mortality of 0.33 per  
cent which is very high.

In the discussion JOHANSSON reported an interest-  
ing case of a corpulent forty-five year-old man. No  
injection had been given him. Suddenly while  
dressing he was overtaken with severe pulmonary  
embolism.

Great care must be taken in drawing conclusions  
in these cases, as the cause of embolism is not always  
clear. (E. GLASS) LEO M. ZIMMERMAN, M.D.

Hindmarsh J. and Sandberg I. Late Results  
Following Embolectomy of the Peripheral  
Arteries (Spätsresultatet nach Embolusentfernung  
an aus peripheren Arterien). *Svensk Läkarsälln.*  
1930 p. 1083.

Key performed the first embolectomy in Sweden  
in 1912. Since that time 43 interventions for ob-  
structive emboli in the large vessel of the limbs have  
been carried out in 40 patients at the Maria Hos-  
pital in Stockholm (30 by Key). The average inci-  
dence of the operation (3 to 5 per year) shows a  
definite increase from the year 1912 to 1934 which  
is evidence that physicians are arriving at the proper  
diagnosis more promptly and the patients are there-  
fore coming to operation earlier. Of the 14 males  
and 26 females in this series the youngest was eight  
years old while the oldest was eighty. In 77 per  
cent chronic cardiac disease was the cause of the  
embolus. The operative results in the upper ex-  
tremity were better than in the lower which fact  
is due partially to the greater collateral circulation in  
the arms (Key). In 4 cases of embolectomies of the  
axillobrachial artery good results were obtained.  
(Re-establishment of the circulation without loss of  
the extremity is considered a good result.) In a case  
of embolectomy at the aortic bifurcation the results

were good also. Operation was carried out for  
emboli in the common and external iliac arteries in  
10 cases. A good result was obtained in only 1.  
Six of the patients died, 2 in spite of a seemingly  
successful operation. Amputation was performed on  
3 patients because of gangrene and 1 of them is now  
living five years after the operation.

In 16 cases the embolus lodged in the common  
femoral artery and in 7 of these the result of op-  
eration was good. Six of the patients died, 2 in spite of  
the fact that good circulation had been obtained.  
In 3 cases amputation was done for gangrene, 1 of  
the patients died and 1 with a bilateral amputation  
is still being treated. Operation for an embolus in  
the superficial femoral artery was done in 6 cases.  
5 of the patients died soon after the operation. In  
the last case amputation was performed and the  
patient died one and one half months after the  
operation. Seven embolectomies were carried out  
for popliteal embolism. Good results were obtained  
in 3 cases and there was 1 early postoperative  
death. Three of the patients required amputation  
and are living today, three five and fifteen years  
later respectively. A good result was secured in  
the single case of embolus in the posterior tibial  
artery.

The significance of early operation is indicated by  
the finding that 45 per cent of the cases operated  
upon within ten hours following lodgment of the  
embolus were cured. Normal circulation could be  
restored in but 21 per cent of the cases operated upon  
after ten hours. Of the patients who left the hospital  
with restored circulation and useful limbs, 16 could  
be followed. Three died (without further data) and  
6 maintained normal circulation up to the time of  
their death. The 7 others were examined 1 seven  
teen years after operation and 1 (the most recent)  
3 months after operation. The results were good  
in 6 patients but 1 revealed marked cardiac decompensation  
and a disturbance of the circulation in the  
leg which had been normal at the time of operation.  
The subjective symptoms had disappeared in all  
of the cases although in some not until from one  
half to a whole year had elapsed. Case reports are  
included in the article.

(GERLACH) WILLIAM C. BECK, M.D.

## SURGICAL TECHNIQUE

### OPERATIVE SURGERY AND TECHNIQUE, POSTOPERATIVE TREATMENT

Foged J and Geill, T. The Prognostic Importance of Pre Operative Electrocardiograms and Roentgenological Examination of the Heart (Die prognostische Bedeutung von präoperativer Elektrokardiographie und Roentgenuntersuchung des Herzens) *Acta chirurg Scand* 1936, 79 35

The authors took pre operative electrocardiograms and roentgenograms of the heart in 428 patients. They found that clinically latent heart disease was present in a great many cases in which active therapy could be instituted if required.

In the group of 253 patients with normal electrocardiograms and roentgenograms, the postoperative mortality from heart failure was 1.2 per cent, and in the group of 100 patients with abnormal electrocardiograms and roentgenograms, but in which the clinical condition of the heart was the same as in the former group, the mortality was 11.8 per cent.

These studies show that by more precise pre operative examination of the heart it is possible to judge the operative risk more accurately and select the material accordingly or modify the plan of operative treatment.

In certain instances (coronary sclerosis myocardial degeneration) examination contra indicates operative treatment unless it is absolutely necessary.

Geill, T. and Lassen H. K. Postoperative Electrocardiographic Investigations *Acta chirurg Scand*, 1930 79 145

In the cases of 30 patients operated on for surgical diseases in which the electrocardiograms before operation had shown degenerative changes, a disappearance or decrease of the changes could frequently be proved after operation. This improvement seemed to be most constant in the cases in which the fundamental surgical disease had been of an infectious nature and, more especially, when it affected the gall bladder and bile ducts. The electrocardiograms became normal in 9 of 10 cases of disease of the gall bladder and bile ducts. However, a follow up examination of 23 patients suffering from surgical diseases who had not been operated on showed that in these cases the electrocardiogram also became normal if the infectious disease subsided spontaneously.

Macfarlane, R. G. Fibrinolysis Following Operation *Lancet*, 1937, 23 10

A small quantity of blood taken immediately after cholecystectomy led to the observation of a curious phenomenon. The blood had been allowed to clot in a centrifuge tube and was left overnight at 37° C. in order that the serum might be obtained when retraction was complete. The next morning,

however, it was found that the blood was quite fluid and trace of the clot, which had been perfectly firm the evening before, had disappeared.

In a recent article Ludin described the Russian method of transfusion with blood obtained from corpses. Stress was laid upon the fact that blood from persons meeting sudden or violent death was particularly useful. If the blood was withdrawn soon after death in these cases, it was found that, though coagulation took place in the ordinary way, the blood returned to the fluid state in the course of an hour or two, the clots having apparently dissolved. Since there was no further tendency to coagulate, the addition of anti coagulants was not required, and the blood could be preserved in this state almost indefinitely and used for transfusion when needed.

Since the fibrinolysis observed by the Russians was believed to be associated with the profound shock experienced before death the question arose as to whether this fibrinolysis occurred possibly in a lesser degree, in living persons who had suffered accidental trauma, or undergone surgical operation. The present article is a report of the admittedly incomplete and elementary experiments with which this investigation has been begun.

In his experiments the author selected patients undergoing surgical operations as the best subjects to begin with, since their blood could be tested immediately before and immediately after the trauma and accurate control could be maintained. The anesthetic, of course introduced a variable factor but by choosing a series of cases with inhalation spinal and local anesthesia, the author believed that the effects of the anesthetics could be determined and eliminated.

At first attempts were made to repeat the original observation. Blood was obtained by venipuncture before and after operation in about 20 cases, and allowed to clot in centrifuge tubes. These tubes were then incubated at 37° C. and the contents examined in twenty four hours. In 2 cases complete lysis had occurred at the end of this time in the postoperative blood. In 1 of these cases the blood had been taken from a woman who had had an operation for cholecystectomy, in the other, from a woman who had had a needle removed from her hand under a local anesthetic.

In a large proportion of the remaining cases, the clots in the postoperative blood appeared to be more friable than those in the pre operative blood, though there was no definite evidence of lysis. The method was unsatisfactory, as the turbidity of the fluid made it impossible to see the state of the clot without interfering with it. It was therefore decided to experiment with recalcified citrated plasmas. Blood was obtained before and after operation, as in the previous series, but was immediately citrated by the

addition of one tenth of its volume of from 3 to 8 per cent sodium-citrate solution. It was then centrifuged at slow speed for ten minutes and the plasma removed by a pipette. Four cubic centimeters of the plasma was recalcified in each case by the addition of 1 c cm of from 1 to 18 per cent calcium-chloride solution and the tubes containing the clots were incubated for twenty-four hours at 37° C. as before. In 2 of 22 cases examined in this way complete lysis occurred during the period of incubation in 1 after nephrectomy and in the other after excision of an epithelioma on the back. Both patients were males and both had had general nitrous-oxide-oxygen and ether anesthesia.

In the remaining 20 cases the signs of lysis were indefinite; in the majority the clots in the postoperative blood were more fragile and the serum was more turbid than the clots and serum in the preoperative blood. However the results were inconclusive and the author decided that a method of measuring the exact degree of lysis after a definite period of incubation was required. His attempt to overcome this difficulty led to the production of what appears to be a delicate and satisfactory method of demonstrating fibrinolysis.

In 22 of a total of 29 cases complete lysis of the clots in the postoperative blood occurred in twenty-four hours. In 2 of the remaining 7 lysis was more marked in the postoperative blood than in the controls and in 3 no lysis occurred during the period of incubation employed.

Experiments were then performed to ascertain if possible the nature of the lysis. Bacteria do not appear to play a part as cultures of the fluid in which lysis had occurred were sterile. Whether this rapid lysis is merely an acceleration of the normal aseptic lysis which is regarded by Nolf as the natural sequel to coagulation remains to be seen.

ELLA M. SALMONSEN

#### ANTISEPTIC SURGERY TREATMENT OF WOUNDS AND INFECTIONS

Gissel Ehrlich. The Clinical Aspects and Therapy of Occupational Injuries Due to the Light Metals (*Zur Klinik und Therapie der Leichtmetallverletzungen*). *Zentralbl f Chir* 1936 p 2663

The light metals are finding wider and wider usage, especially in the aeroplane industry and in the Rostock region a new disease picture is being observed. In the injuries caused by the light metals (dural hydronahum elektron) tissue changes which differ from those caused by the long known heavy metals are found. By and large there are 3 disease pictures: (1) local inflammation after from one to three days abscesses phlegmons and panaritria (2) no definite local inflammation but painful swellings of the skin and subcutaneous fat tissue from the size of a lentil to that of a German mark which last for weeks (3) inflammatory skin diseases (eczema furunculosis) which appear only after from three to six months.

Bacteriological examination of small bits of the light metals show that in contrast to the various other types of metals (iron steel, copper etc) the light metals carry an extraordinarily large amount of bacteria. It cannot be determined whether the corrosion layer of the light metal consisting of oxyd, hydro-oxyd, and carbonate, is responsible for the bacteria. A healing ointment called dural salve at the aeroplane works consisting of liquor aluminii aceto-tartarici 30 balsamum peruvianum 100 lanolin 100 Past zinci salicyli ad 1000 has proven very valuable.

Since the wounds are given an immediate special cleansing washed out with hydrogen peroxide solution and covered with dural salve severe complications have become rare.

(E. GLASS) JOHN W. BRENNAN M.D.

Freil W. The General Biology of Anaerobic Bacteria and the General and Comparative Pathology of Anaerobic Diseases (*Allgemeine Biologie der anaeroben Bakterien und allgemeine und vergleichende Pathologie der Anaerobierkrankheiten*). *Ergebn d Path* 1936 pt 1

The general biological characteristics of the anaerobic bacteria and of the human and animal diseases which they produce are discussed in detail from the clinical and pathologico-anatomical standpoint. The author describes the most important anaerobes, their occurrence in general, in food, and in the body together with their requirements for growth and culture. Special consideration is given to the metabolism and respiration. After discussing the resistance of the anaerobes to unfavorable influences such as increased temperature, the oxygen of the air, oxidizers and reducing agents particularly to cyanogen the author describes in detail the diseases induced by them. For the development of these diseases there are certain prerequisites with regard to the organs as well as to the infecting bacteria. The grade of virulence and pathogenicity of the bacteria and the disposition and resistance of the host are of importance. An important rôle is played by the metabolic products of the infecting bacteria or spores and by symbiosis with other anaerobic or aerobic bacteria. Physiologico-chemical changes, interruption of the oxygen supply and the circulation of blood, and alteration of the reduction potential which improves the conditions for the invading bacteria take place in dirty, licerated necrotic or crushed infected tissues. The bacteria enter the body through wound of the skin and mucosa and through the gastro-intestinal tract. The anaerobes in the invaded organism may either be killed off, increase in number and produce disease or lie quiescent to become virulent at some later period. Regarding the classification of anaerobic diseases there are first those which cause severe disturbances in the local tissues, such as gas gangrene, anthrax, malignant edema, paranthrax and necrosis, and second those which injure the nervous system chiefly, producing tetanus.

and botulism. The pathogenetic and pathologico-anatomical changes caused by these diseases in man and animals are reviewed comprehensively by the author. In conclusion he discusses the epidemic aspects of these diseases.

(H. Gross) JOHN W. BRENNAN, M.D.

### ANESTHESIA

Woodbridge, P. D. Pre-Operative Estimation of the Anesthetic and Surgical Risk. *Am J Surg*, 1936, 34, 470

For an approximate estimation of the anesthetic risk technically difficult or laborious procedures are usually unnecessary. Four of every 5 dangerous conditions will be detected and clues to the fifth will be obtained from minimal data concerning the patient's age, strength, glycogen reserve, cardiovascular symptoms, urine, and hemoglobin content of the blood. These determinations require but brief inspection and questioning and some degree of medical experience and judgment in addition to simple laboratory tests. However, the further details of the history and the findings of physical examination, special examinations and laboratory tests should usually be available and should always be obtained when the minimal data indicate that they may be helpful.

With the exception of chloroform, any of the commonly used anesthetics and methods of inducing anesthesia is reasonably safe for almost every patient. However, the pathological state of the patient is only one of the hazards of the operating room. Fully as important in the ultimate outcome are the surgeon and the anesthetist. The former obviously has abundant opportunity to run into trouble, and carelessness or poor training of the anesthetist may result in a patient's death when every other circumstance favors complete recovery. The anesthetist may administer either too rapidly and thus induce respiratory complications. He may fail to observe or evaluate the signs of shock or to institute measures to combat it. He may permit a spinal anesthetic to run too high and fail to administer artificial respiration. He may permit a respiratory obstruction to develop with resulting complications or death, immediate or late. Every general hospital should provide a place for, and every surgeon should see that his patients have the services of, a competent anesthetist. It may even be said that the skill of the anesthetist is the most important factor in the determination of the anesthetic risk. J. THORNELL WITHERSPOON, M.D.

Thalheimer, M. The Induction of Anesthesia by the Intravenous Injection of Methyl-Allyl Iso Propyl Barbituric Acid (Anesthésie par injections intraveineuses d'acide 1 méthyl 3, 5 allyl isopropyl barbiturique). *Anes et anal*, 1936, 2, 560

Although the author prefers inhalation anesthesia, he was obliged to use intravenous anesthesia in his station in North Africa. He reports the use of a new

product, narconumal, an alcoholic derivative of numal, which he has employed in about 500 cases. He reviews the development of this product and gives its chemical formula.

Preliminary studies showed that the lethal dose for dogs is about 12 cgm per kilogram of body weight injected in from two to three minutes. The anesthetic dose varies from 1 to 5 cgm per kilogram of body weight. The rapidity of the injection was found to be of great importance. A dose of 10 cgm per kilogram of body weight was lethal when it was injected in half a minute, but tolerated when it was injected in three minutes. In man, loss of consciousness occurs after the injection of from 2 to 4 c gm of the prepared solution. As the injection is continued, the reflexes next disappear. The respirations then become deep and sighing, and there is a moderate acceleration of the pulse with a slight fall in the blood pressure. No unfavorable effects on the kidneys have been noted.

Twenty minutes before operation, a subcutaneous injection of morphine or pantopon is given. Two grams of the powder are dissolved in 20 c cm of distilled water. The injection is made at the bend of the elbow very slowly, the maximum amount given being 2 c cm per minute. The patient is requested to count aloud during the injection. Ordinarily he ceases counting between 30 and 50. Withdrawal of blood into the syringe must be avoided as the alkaline solution causes hemolysis. As soon as the patient is asleep it is important to watch his ocular reflex. Cyanosis may be corrected by holding the lower jaw up or by the administration of several inhalations of carbon dioxide to stimulate respiration. It is absolutely necessary to have an assistant available to hold the jaw while the anesthetist slowly continues the intravenous injection. Anesthesia lasting for as long as two and a quarter hours has been obtained. In several cases as much as 30 c cm (3 gm) of the anesthetic has been used, but in general the quantity should not exceed 20 c cm (2 gm). It is important to suit the dose to the patient rather than to the operation. An operation for extra uterine pregnancy was performed with the use of only 4 c cm of the anesthetic. Each patient seems to have an "anesthetic level." When this is reached, only a few more drops of the solution are needed for surgical anesthesia.

In the first 424 operations performed under anesthesia induced with narconumal, pulmonary complications were completely absent. Postoperative vomiting occurred in only 35 cases and urinary retention in only 12. In all of the latter the operation was performed for hemorrhoids. There was 1 immediate death, that of a patient with cancer of the floor of the mouth who, the author states, should not have been operated upon, but begged that something be attempted for him under general anesthesia. There were 6 late deaths—all from causes other than the anesthesia. One occurred on the third, three on the eighth, 1 on the thirteenth, and 1 on the twenty-second day. Thrombosis of the vein and prolonged

coma occurred in occasional cases. Supplementary inhalations of ether or nitrous oxide can be given very easily if necessary. After operation the patient may wake in half an hour or may sleep for from twelve to twenty four hours.

In conclusion the author states that a complete and lasting anesthesia can be obtained easily with narconal because its toxicity is low but for the avoidance of accidents it is necessary to follow the technique he outlines very carefully.

MAX M. ZININGER, M.D.

Lundy J. S. Intravenous Anesthesia. *Am J Surg* 1936 34 559

Intravenous anesthesia began with the use of chloral hydrate in 1872 by Ore of Lyons, France. Then followed the use of hedonal ether and chloroform, paraldehyde, isopropyl magnesium sulphate, ethyl alcohol, somnifen, isopropyl pernocton (pernoson), allonal, avertin, sodium amylal, pentobarbital sodium (nembutal), evipal, soluble pentothal sodium, eunarcin and narconal. Of these agents, pentothal sodium seems to be the most promising. The use of a 5 per cent solution administered slowly and intermittently as needed after the principle of the use of ether by the drop method is recommended. A cotton butterfly attached to the upper lip indicates whether the air passage is patent and functioning.

In the period from June 18, 1934 to November 1, 1936, intravenous anesthesia induced with pentothal sodium was employed at the Mayo Clinic in 3,613 cases. In 1,395 of the latter drugs said to be respiratory stimulants were added to the anesthetic solution in the syringe. This was done especially in cases in which preliminary medication was given. The preliminary medication consisted usually of the administration of 15 gr. (0.997 gm.) of pentobarbital sodium by mouth the night before the operation and of 1/8 gr. (0.0125 gm.) of morphine sulphate and 1/150 gr. (0.0003 gm.) of atropine by hypodermically one hour before operation. The syringe recommended has a 20 ccm. capacity and an eccentric tip and the needle which should be 20 gauge and 1 1/4 or 1 1/2 in. in length has a moderately short bevel.

It is safer to take thirty seconds to induce the anesthesia than to induce it in ten seconds. Avoidance of hurried induction will be aided by requesting the patient to count aloud about 1 count per second. In deep anesthesia respirations are shallow, in light anesthesia they are deeper. The largest dose used in any of the reviewed cases was 35 gr. (2.3 gm.) and the longest time of operation three and a half hours.

Atropine is the most important drug to be used in preliminary medication as it keeps the throat dry. Ambulatory patients should not be left alone after the administration of pentothal sodium until they are able to walk without staggering. A few patients have displayed certain undesirable reactions to the anesthetic such as tremor, sneezing, cough-

ing or hiccuping. In almost all instances these occur in the induction period rather than during the period of maintenance, or at least they do not begin until after the administration of the first 0.5 gm. of the drug.

Cases in which intravenous anesthesia seems to be of the greatest advantage are those in which painful packs are to be removed or spinal puncture is to be done. However it should be used only if dyspnea is not present and the respiratory passage is free and of normal patency throughout.

Some patients will answer questions during the operation but remember no pain. In certain diagnostic and prognostic tests, pentothal sodium has been used to raise the temperature of the extremities to the maximum. In many cases of hypertension the blood pressure can be temporarily reduced to a greater or less degree by means of this drug. This effect may assist the clinician in deciding whether or not a case is suitable for surgical treatment of the hypertension. In rare cases, the blood pressure becomes elevated on administration of the drug.

Some patients show considerable resistance to the induction of anesthesia with pentothal sodium but as a rule this occurs only when preliminary medication has not been given or has been administered for so short a period prior to the administration of the anesthetic that it has not been effective.

The values for blood sugar and blood urea were determined in a representative group of cases by Betlach and Tovell. It was found that the concentration of blood sugar is raised appreciably by pentothal sodium, as it is by other derivatives of barbituric acid. However, the difficulty of controlling the metabolism of carbohydrates in cases of diabetes in which the drug has been administered has not been increased materially. The variation in the concentration of blood urea before and after the anesthesia is negligible.

The use of pentothal sodium intravenously is recommended for cases in which convulsions appear during general anesthesia and for those in which convulsions occur as the result of poisoning brought about by local anesthetics.

Lundy J. S. and Tuohy E. B. Regional Anesthesia: Agents and Methods. *Am J Surg* 1936 34 511

The authors consider procaine, also called 'novocain' and procaine, the most valuable of all the local anesthetic agents because of the relative infrequency of untoward results attending its use. However, it is not a good surface anesthetic. For surface anesthesia other agents have been synthesized. Among these are pontocaine, a drug known in Europe as percaine and in America as nupercaine and metycaine. In addition to being a surface anesthetic, pontocaine is capable of producing prolonged local and spinal anesthesia. It is about 10 times as potent and therefore 10 times as toxic as procaine. The authors are of the opinion that next to procaine metycaine is the most promising because it

will produce surface anesthesia, local anesthesia, and spinal block anesthesia. It is not so toxic as nupercaine or pontocaine, but its effect lasts a little longer than that of procaine.

Vasoconstrictors are often used to advantage with local anesthetics. Among the former are epinephrine or adrenalin, ephedrine, and cobefrin. The formulas and physiological effects of the agents are similar. From the standpoint of local hemostasis, epinephrine is the most useful for admixture with a solution of local anesthetic for the infiltration of tissue. Ephedrine does not satisfy the demands of this phase of local anesthesia. On the other hand, epinephrine is not equal to ephedrine in sustaining the blood pressure during spinal anesthesia. For hemostasis, cobefrin is the equal of epinephrine but not of ephedrine.

The barbiturates used in connection with local and regional anesthesia are of value as they bring the patient to a condition in which he is not apprehensive and forms within his body little more than the normal amount of epinephrine.

A review made at the Mayo Clinic disclosed that in a period of four years the number of patients who were given local anesthetics was greater than the number who were subjected to any other one agent or method of anesthesia. Various methods of block anesthesia are employed at the Clinic. Of these, the authors find brachial plexus block the most difficult to use. Cervical block is employed in a certain number of cases but not in so large a number now as before the introduction of Magill's intratracheal method of administering a general anesthetic. Field block and infiltration of tissue is performed year in and year out because this procedure affords good anesthesia in a high percentage of cases. Sacral block is frequently done because many operations are performed in the Clinic for anal and rectal conditions. For anal operations sacral block is without doubt the best method of inducing anesthesia. This has been true especially since the development of various preparations which are useful for preliminary medication, particularly pentobarbital sodium, or nembutal. Spinal anesthesia is used frequently and with considerable satisfaction, but is not employed when the patient is markedly debilitated. Splanchnic anesthesia induced through the posterior approach of Kappas has not been sufficiently satisfactory (successful in 48 per cent of cases) to warrant its use except in unusual cases. When block anesthesia of a digit is desired a wheel is produced on the dorsum of the member and injections are made around the finger at a point proximal to the site of operation. For operations on the neck, deep block

anesthesia is satisfactory. Superficial cervical block also provides good anesthesia and can be established very simply by infiltrating the tissue between the skin of the neck and the superficial surface of the sternocleidomastoid muscle.

Procaine is used extensively for spinal anesthesia and other types of regional anesthesia such as sacral block, cervical plexus block, and abdominal wall block. Vasoconstrictor drugs such as epinephrine and cobefrin are employed to prolong its action, and in spinal anesthesia ephedrine is used to help sustain the blood pressure. Barbiturates are administered prior to the use of procaine because of their sedative and antispasmodic action. The technique of the induction of spinal anesthesia and numerous regional anesthetic procedures is described, and the indications for such methods are stated.

Magill, I. W. Endotracheal Anesthesia. *Am J Surg.* 1936, 34: 450.

The maintenance of a free airway has long been recognized as the first principle of general anesthesia, and the danger of complete laryngeal obstruction has always been obvious. On the other hand, the cumulative effects of partial respiratory obstruction have been frequently overlooked and it is not improbable that many of the surgical difficulties, postoperative complications, and even fatalities attributed to the anesthetic have been due primarily to an imperfect airway.

Endotracheal anesthesia should be attempted only when the necessity for it has been carefully considered. It is of advantage because it gives the anesthetist complete control of the airway, it places no burden on the respiratory mechanism, it permits a lighter and more even anesthesia, blood can be kept from entering the trachea, the anesthetist is clear of the field of operation, the surgeon is protected from the patient's exhalations, suction can be employed in certain thoracic operations, and the anesthetic can be confined to one lung, the other being left in a state of collapse.

Its disadvantages are that the anesthetist must be a skilled intubationist and instrumentation carries some risk of trauma. In pharyngeal operations the tube may encroach on the surgical field.

This method is contra-indicated in acute tonsillitis, acute inflammatory disease or new growth close to the vocal cords, operations for toxic goiter except when there is extreme pressure on the trachea, and thoracoplasty.

The necessary equipment and the technique of intubation are described in considerable detail.

GEORGE A. COLLETT, M.D.

# PHYSICO-CHEMICAL METHODS IN SURGERY

## ROENTGENOLOGY

Guercio F. and Lo Monaco G. A Roentgenkymograph Study of the Respiration in Pregnancy and the Puerperium (Studio radiocinematografico della respirazione in gravidanza e in puerperio) *Radiol med* 1936 23 9,6

The history of roentgenkymography and its application to the study of the movements of various organs is briefly reviewed.

By means of roentgenkymography the authors have investigated the mechanical factors of respiration in pregnancy and during the puerperium. This was done to ascertain the truth of the assertion that pregnant women have an increased susceptibility to pulmonary tuberculosis and other lung infections because of impaired mechanical respiration.

Kymograms of a series of normal cases showed a diminished excursion of the right cupola of the diaphragm with a compensatory increase in excursion of the left diaphragm and the lower six ribs on both sides. They believe that the mechanical respiration is fully compensated. In patients with very large abdomens due to twin pregnancy or hydramnios the diaphragmatic excursion may be greatly limited but there is compensation through increased lateral excursion of the ribs. In 1 patient with cardiac disease the ribs were stationary but the diaphragm showed increased excursion.

It is concluded that susceptibility to respiratory infection is not due to impairment of the mechanical factors of respiration. SYDNEY E. JOHNSON, M.D.

## RADIUM

Pack, G. T. A Plan for the Treatment of Cancer with Small Quantities of Radium. *Arch Surg* 1936 33 940

For the person contemplating the organization of a tumor clinic in a general hospital the author here with presents some exceptionally valuable information. He outlines the minimum requirements in radium and radium equipment for various types of communities. The radium specifications are minutely described the strength distribution and filtration of the various containers as well as the costs are given and discussed.

It is pointed out that the minimal quantity of radium necessary for a tumor clinic depends upon the population of the city, the death rate from cancer, the estimated number of cases of cancer in the community, the number of beds in the hospital and the prospective rate of growth. The Josephine Lendrum Tumor Clinic of Paterson, New Jersey, for instance is associated with a 325 bed hospital located in a city of 150,000 inhabitants. In order to have adequate and flexible distribution it was necessary to use a minimum of 130 mgm. of radium supplied

mented by high voltage x ray equipment with a 200 kv. therapeutic unit at from 20 to 30 ma. The radium could be used in the treatment of the skin, lips, tongue, tonsils, antrum, larynx, cervix and uterus as well as for interstitial irradiation in carcinoma of the stomach, colon, rectum, bladder, prostate and breast.

Pack recommends the use of Sluys individual cells and 130 mgm. of radium. His specifications are as follows:

SPECIFICATIONS FOR RADIUM (130 MGm.) AND CONTAINERS FOR TUMOR CLINIC WITH ESTIMATE OF COST

All the radium is furnished in platinum cells 17.5 mm. in length, 1 mm. in external diameter and 0.2 mm. in wall thickness.

No. of Cells	Radium Content per Cell	Total No. of Mgms.	Value
14	3.33 mg	46.62	\$1,631.00
63	1.33 mg	83.90	2,932.65
		130.41	\$4,564.35

- 14 Platinum cells (The 14 cells containing 3.33 mgm. each should be goldplated to distinguish them from the 63 cells containing 1.33 mgm. each) at \$4.00 each \$ 56.00
- 63 Platinum cells at \$3.25 each 204.25
- 6 Platinum iridium tubes with bulldog eye measuring 19.53 mm. in wall thickness each to contain 4 of the foregoing cells at \$20.00 each 120.00
- 1 Platinum iridium tube with bulldog eye measuring 19.5 mm. in external length, 4.13 mm. in internal diameter and 12 mm. in internal length to contain 8 cells 23.00
- 3 Special screw-cap brass tubes of 1.5 mm. in wall thickness, 24 mm. in external length and 4 mm. in internal diameter, 20 mm. in internal length and 7 mm. in external diameter at \$2.50 each 7.50
- 20 Small platinum iridium (20 per cent) needles with 1 eyelet and removable trocar point (Trev's needles) measuring 17 mm. in length, 1.65 mm. in external diameter and 0.3 mm. in wall thickness. Each to hold 1 cell at \$10.00 each 100.00
- 14 One-cell gold sheath needles with removable platinum iridium points at \$4.80 each 67.20
- 8 Two-cell gold sheath needles with removable platinum iridium points at \$5.40 each 43.20
- 12 Four-cell gold sheath needles with removable platinum iridium points at \$6.45 each 77.40
- 3 Brass plaques of varied sizes to hold the radium cells in the treatment of epithelioma of the skin, at \$10.00 each 30.00
- 1 Tray or pack—distance applicator for radium—designed to contain the platinum filtered radium cells 15.00
- 10 Curie colposcopes at \$8.50 each 85.00
- 1 Flat vaginal applicator or spoon (Healy model) 15.00
- 1 Bomb for surface irradiation of cervix (Bailey model) 25.00

1 Berven tonsil applicator for surface irradiation of tonsil	45 00
2 Intubation tube (O'Dwyer model) for larynx—designed to hold radium cells within its circular walls	20 00
Equipment for protection of radium workers	230 00
<b>Total</b>	<b>\$5,677 90</b>

When 250 mgm of radium can be obtained it is suggested that the removable cell technique be used, and the radium be divided as follows

1 Platinum-iridium tube containing a platinum cell permanently sealed in the tube, and with a bulldog eyelet. The over all length of the tube is 21.7 mm, the wall thickness, 0.5 mm of platinum, the external diameter, 2.5 mm. This tube costs \$20.00 and contains 26.64 mgm of radium (200 mc destroyed hourly)	26.64 mgm
4 Platinum-iridium tubes each containing a platinum cell permanently sealed in the tube. The over all length of the tube is 21.7 mm, the wall thickness 0.5 mm of platinum, external diameter, 1.9 mm. Each tube costs \$12.75 and contains 13.32 mgm of radium (100 mc destroyed hourly)	53.28 mgm
51 Platinum cells, 11.5 mm long, a wall thickness of 0.2 mm of platinum, each to contain 1.33 mgm of radium	169.83 mgm
<b>Total</b>	<b>249.75 mgm</b>

This equipment permits better distribution in the treatment of carcinoma of the cervix.

The equipment for the protection of the radium workers consists of an assembly table, an assembly forceps with lead hand shield, a hand carrier for radium and radium applicators, and a container for individual platinum cells of radium.

Both the capsules and the needles have a low radium content so that several days are required to deliver a cancerocidal dose. This method enables the radium therapist to give a much larger dose than would be possible with greater intensity, and is a distinct advantage.

For the treatment of cancer of the skin a series of trays, plaques, and molds are described. The plaques vary from a minimal size of 1.8 sq cm, with a radiation of 2 sq cm. The filter or floor of the plaque is 2 mm of brass, to which is added the 0.2 mm of platinum for the radium bearing cells which fit into the brass plaque. The next size plaque has a radiating surface of 3.75 sq cm, and the third size has a radiating surface of 7.0 sq cm. The radium skin distance is 1 cm for all 3 plaques. The dose varies from 700 mgm hr with the smallest plaque to as high as 2,000 mgm hr with the largest.

The trays are larger applicators used at a distance of 3 cm from the skin. They are also filtered with 2 mm of brass which is supplemented by the filtration strength of the radium cell. The trays give a greater depth dose than the small radium plaques.

Molds for the treatment of skin lesions are made from wax, the formula of which is 100 gm of yellow wax, 100 gm of paraffin fusible at 62° C, and 20 gm of finely sifted sandust. This mixture is melted into sheets 1 cm thick. The wax can be readily softened at 48° C and molded over the tumor until it hardens into a permanent mold. This wax can be made into various thicknesses but from 1 to 1.5 cm is recommended by Pack. The dose per unit of surface is increased with the thickness of the wax (radium skin distance), augmented with the thickness of the filter, and diminished with the extent of the surface irradiated. The radiosensitivity must, of course, be taken into consideration. In the treatment of cancer of the lip, molds are used. The wax which has been described may be used for a dental molding compound. The average dose in the treatment of these lesions is from 0.75 to 1 mcd per sq cm of tissue treated. Interstitial radiation is used also in the treatment of lip lesions.

In the treatment of cancer of the tongue intra oral hygiene receives consideration before irradiation is instituted. Interstitial irradiation with hollow needles is used for the tongue and floor of the mouth. The principles followed in the treatment of intra oral cancer are those established by Regaud. He advocates (1) the distribution of numerous and weak, radio active foci in the cancer and surrounding tissues, with care to create a radiation field as uniform as possible, (2) the use of gamma rays only in order to avoid a necrotizing effect, (3) continuous irradiation of low intensity for a long time, and (4) the use of a single treatment for successful results.

For tonsillar carcinoma external radiation with the 200 kv machine at 30 ma, a target skin distance of 60 cm, and a filter of 0.5 mm of copper and 2.5 mm of aluminum is recommended. Two large portals are used, so that both sides of the neck may be treated and the rays may penetrate from each side of the cheek and upper part of the neck. A total dose of from 3,200 to 4,000 r is given to each side by the fractionated method. Only 300 r is given daily, and the irradiation is alternated to each side of the neck. For local application the Berven tonsil applicator is recommended.

Carcinoma of the antrum is treated by surgical exposure followed by local applications of radium and external irradiation.

Carcinoma of the larynx is treated by external irradiation, supplemented by intracavitary irradiation in some cases of intrinsic lesions of the larynx.

Tumors of the parotid gland are treated by surgical excision followed by external irradiation.

In general, metastatic carcinoma of the cervical lymph nodes, which is more radioresistant than primary lesions, is treated by a combination of external irradiation and interstitial irradiation. The indications and contra indications for radical or partial cervical dissection must be carefully considered before irradiation therapy is employed.

Patients having carcinoma of the esophagus are always subjected first to a preliminary esophagus



copy to obtain a biopsy specimen and histological grading of the tumor and to localize the lesion. This procedure is supplemented by fluoroscopy. A Janeway gastrostomy is then performed and the lesion treated by external irradiation with the 200 kv machine. In some cases the external irradiation is supplemented by intracavitary radium therapy.

Cancer of the stomach, rectum, prostate, bladder and colon are treated by surgery followed by interstitial and supplementary external irradiation.

For treatment of cancer of the cervix the colpostat in conjunction with the intra uterine tandem is recommended. Two tubes containing 26.64 mgm and 13.32 mgm respectively are used in the intra uterine tandem and 13.32 mgm are used in each of the corks of the colpostat so that the intra uterine applicator contains 39.96 mgm and the colpostat contains the same amount. This arrangement gives uniform irradiation which is used over a period of seventy five hours. The total dose amounts to 6,000 mgm hr—3,000 mgm hr of intra uterine irradiation and 3,000 mgm hr of intravaginal. This treatment is supplemented by external irradiation. In lieu of the Curie colpostat and tandem the vaginal bomb may be used.

Grades I to III of carcinoma of the corpus are treated by radical panhysterectomy after intra uterine therapy. The inoperable cases are treated by preliminary high voltage roentgen therapy through 4 pelvic portals using the fractionated principle employed in the treatment of carcinoma of the cervix. This irradiation is followed by intra uterine radium therapy.

The treatment of choice for operable carcinoma of the breast is radical amputation. If the tumor is on the borderline of operability, the radical mastectomy is preceded by roentgen irradiation. Routine post operative irradiation is recommended. Inoperable and recurrent carcinomata are treated best by external irradiation supplemented by interstitial irradiation.

If a mammary carcinoma is to be treated only by irradiation an aspiration biopsy should be made to confirm the diagnosis. The breast axilla and supra clavicular spaces are treated by high voltage roentgen therapy. Five skin portals are used: the median side of the breast, the lateral side of the breast, the axilla proper, the posterior axilla and the supra clavicular space (the latter field including the superior part of the breast) and the anterior axilla. The beam is directed tangentially to the wall of the chest. Two fields are treated daily at 50 cm target skin distance with doses of 250 r each. The treatments are alternated daily until each field receives from 1,500 to 1,750 r. The external radiation is followed immediately by the insertion of radium needles. The dose to be given interstitially is calculated by subtracting the tissue dose delivered by the roentgen rays from the known cancerocidal dose of from 6 to 10 threshold erythema doses.

The treatment described should not be interpreted as instructions in the methods of radiation therapy but rather as an indication of the wide range of use of the different types of radium containers which the author has recommended.

L. M. ROSENTHAL, M.D.

# MISCELLANEOUS

## CLINICAL ENTITIES—GENERAL PHYSIOLOGICAL CONDITIONS

**Herbrand, J** Post traumatic Edema of the Arm  
(Das posttraumatische Oedem des Armes) *Beitr. klin. Chir.* 1936 164 492

Traumatic thrombosis of the arms is well known clinically, but its cause has not yet been definitely established. The symptoms in most cases are sudden disability, subjective sensations of heaviness and numbness, bluish discoloration, and swelling of the skin and especially of the subcutaneous tissue and limitation of motion.

Herbrand reports the case of a healthy twenty-year old laborer who was struck on the olecranon of the right arm by a piece of iron. He paid no attention to the injury and kept on with his work. During the night the symptoms of thrombosis of the axillary vein appeared. Three weeks later a specimen 5 cm. long was excised from the markedly thrombotic cephalic vein. (The patient had had no fever during this time.) Microscopically, the specimen showed positively no vessel wall inflammation, but merely tissue organization. Six weeks after the beginning of the illness the patient was dismissed and declared able to work, but the veins of his elbows were palpable as rough strands and there were pronounced venous markings from the anterior shoulder region to almost the middle of the chest. The condition was probably caused by a number of factors, but muscle strain and infection which are usually responsible for it were ruled out in this case.

(BLUMENSAAT) MATTHIAS J SEIFERT, M D

**Ait, H L and Swank, R L** Thrombopenic Purpura Associated with Catarrhal Jaundice *Ann. Int. Med.* 1937 10 1049

A patient was observed in whom acute thrombopenic purpura occurred simultaneously with acute catarrhal jaundice. The patient was a man, aged twenty-four, and he had all the typical symptoms of the two conditions. He began to recover soon after his admission to the hospital and was cured within three weeks.

A review of the literature revealed that thrombopenia with or without purpura occurs rather frequently in liver diseases other than catarrhal jaundice. Therefore it was assumed that in the reported case the thrombopenic purpura was secondary to the catarrhal jaundice.

HOWARD I AIT, M D

**Mettler S R and Furlance K** The Hemorrhagic States. The Value of Roentgen Irradiation of the Spleen in Essential Thrombocytopenic Purpura Hemorrhagica *J Am Med Ass.* 1937 108 83

The authors state that a case of purpura can almost always be properly classified by means of a

careful study of the history to discover a familial tendency toward hemorrhage, the dietary habits of the patient, the presence of recent infection, and whether marrow depressing drugs have been used, and by means of an accurate study of the blood together with determination of the permeability of the capillaries.

A case of subclinical scurvy with hypochromic anemia showing a positive tourniquet test is reported. Daily intravenous treatment with 150 mgm of sodium of cevitamic acid produced a negative test on the fourth day. There is also reported a case of recurring essential thrombocytopenic purpura hemorrhagica and hypochromic anemia. Daily roentgen irradiation was given over the splenic area in doses of 200 r until the patient had received a total of 1400 r. On the fourth day of treatment the platelets had risen from 80,000 to 135,000 per cmm and on the seventh day numbered approximately 300,000 per cmm. Coincidentally, there was a cessation of spontaneous bleeding, the clotting time was reduced to five minutes, and normal retraction occurred.

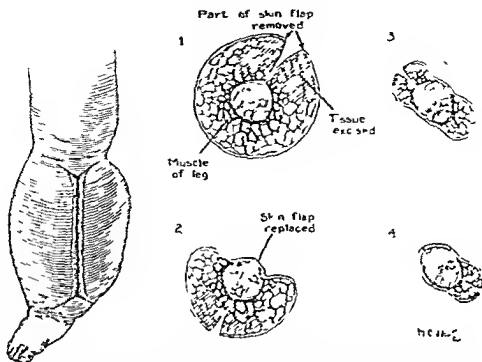
WALTER H NADLER, M D

**Homans J** The Treatment of Elephantiasis of the Legs. A Preliminary Report *New England J Med.* 1936, 215 1099

Elephantiasis of the legs is characterized by gradual swelling. In a mild case the condition may require ten or more years for its full development while in a severe case a very high degree of tense swelling may be reached in a year or two. As the disease advances the skin thickens and the subcutaneous tissues gradually harden until putting on pressure can no longer be demonstrated. Finally, the superficial parts, especially near the ankle, are thrown into great folds with deep creases between them.

Once the leg has become tensely swollen there may set in the remarkable febrile attacks which are so apt to complicate every type of elephantiasis, tropical or other. These attacks are characterized by heat, redness, and additional swelling of the whole limb and by a rapid rise in the general temperature which is usually preceded by a chill. They are completely self limited. Abscess formation never occurs. Their cause has always been obscure, but in recent years the presence in the tissues of a non pyogenic streptococcus has been generally admitted.

In the elephantiasic leg there are no longer any functioning lymph vessels. Fluid flows back and forth through the dilated tissue spaces by gravity. The enlargement is completely superficial to the muscular anastomosis. However, the muscles have no lymph, and no lymphatics can be demonstrated about the femoral vessels. On exploration of the pelvis the great lymph trunks about the iliac vessels are found to be fibrosed and almost functionless. Therefore treatment based upon the idea of connecting the



The plastic operation for elephantiasis 4 steps. On the left, the first incision. The cross-sections show the tissue to be excised (shaded) and approximately the amount of skin flap removed (shaded) at each operation. Operation 3 and 4 are performed three months after Operations 1 and 2. The heavy black shading indicates the region of thickest scar tissue, that often is permeated with lymph-filled spaces.

superficial tissues with the deep parts is bound to fail.

In mild cases the edema can be controlled by bandaging. In serious cases operative treatment is necessary. Operations today differ somewhat from the original procedure of Kondoleon, the object of which now appears to be unattainable. The modification of Sistrunk is only slightly superior to the old plan. Auchincloss in treating the tropical form of the disease, tried to remove as large an amount of filaria-containing tissue as possible. He confined his operation to the lower leg. While he did not propose doing away with all of the subcutaneous tissue of the leg he hinted that this might be advisable.

The series of operations required is shown by illustrations. Each operation is performed with aid of an Esmarch bandage. At the first operation long flaps are outlined on the antero-internal surface of the calf and the dissection is carried down at once through the aponeuroses. Thick flaps including the aponeurosis are then turned up to expose at least a quarter of the circumference of the leg. The thin skin flaps are then prepared and the great mass of lymph-soaked tissue thus isolated is excised. The Esmarch bandage is then removed, bleeding is controlled, and the skin flaps are tacked to the deep parts with fine chromic catgut. The long broad hol-

low in the leg is carefully padded with gauze and solidly bandaged. A similar but less extensive operation on the foot may be necessary.

Perhaps a week after the first operation a second plastic is carried out on the opposite or posterior external surface. In this it is important to preserve at least a part of the nerve supply to the heel that is the sural nerve. An interval of two months should elapse before the final pair of plastics is carried out.

The author has had 11 cases of elephantiasis nostra. Two were probably cases of the familial disease and have not been treated. Eight patients have been subjected to operation but only 4 have accepted the complete plastic in 4 steps. Operation of the thigh is not required. The use of a bandage for the leg after operation is probably necessary.

For elephantiasis due primarily to infection plastic surgery is not clearly indicated.

GEORGE A. COLLETT, M.D.

Topley W. W. C. Raistrick, H. Wilson, J. Seacer, M. and Others. Immunizing Potency of Antigenic Components Isolated from Different Strains of Bacterium Typhosum. *Lancet* 1917, 232, 233.

It has been shown that certain smooth strains of bacterium typhosum are differentiated from many

of the ordinary laboratory strains by being very slightly agglutinable in antisera containing agglutinins to the somatic "O" antigen. These "O"-inagglutinable strains are relatively virulent for mice, while the ordinary "O" agglutinable strains are relatively avirulent. The "O" inagglutinability is determined by the presence of an additional antigenic component—Felix's "Vi" antigen. This component is relatively labile in the presence of heat, and "Vi" strains subjected to temperatures of over 50 C become freely agglutinable with an "O" antiserum.

When "Vi" bacilli killed in various ways, are injected into mice they induce an effective active immunity against a subsequent injection of living "Vi" bacilli. However, vaccines prepared from dead bacilli of the smooth "O" strains have been found to be relatively ineffective in inducing an active immunity.

The authors have found that the whole bacterial cells from a "Vi" strain of bacterium typhosum, killed by the addition of formal and heating to 55 C, are a more effective immunizing agent in the mouse than the whole bacterial cells derived from an "O" strain. This difference is relative, not absolute. It is most evident when the immunizing injections are given by the subcutaneous route, and when there are not more than 2. When 3 injections are given intraperitoneally, the dead "O" bacilli induce an immunity of the same kind as that induced by the dead "Vi" bacilli.

These results are exactly paralleled by the purified antigens of the F 68 type (the antigenically active fractions which are flocculated by 68 per cent alcohol) isolated from the "Vi" and the "O" strain. These components probably represent the complex somatic antigens of typhoid and paratyphoid bacilli in their natural state.

Preliminary chemical studies have shown that the F 68 antigen isolated from a "Vi" strain differs in certain of its chemical characters from the F 68 antigen isolated from an "O" strain.

The findings admit of only 2 hypotheses. Either the "Vi" antigen is a modified "O" antigen, or the "Vi" antigen, though a separate chemical entity, has chemical properties so similar to those of the "O" antigen that it remains associated with it throughout a long series of chemical fractionations.

SAMUEL KAHN, M D

Stamp, T C and Hendry, E B. Immunizing Activity of Certain Chemical Fractions Isolated from Hemolytic Streptococci. *Lancet*, 1937, 232 257

Fractions capable of inducing active immunity in mice have been isolated from strains of hemolytic streptococci belonging to Groups A and C. The active fraction from the Group C strain is soluble in dilute acids but insoluble in ammonia, and is probably a protein. It appears to be comparatively stable, and is not inactivated by ammonia. The active fraction from the Group A strain resembles

that from the Group C strain in that it is acid-soluble. It is inactivated by ammonium hydroxide and gradually loses its potency. It also appears to be protein in nature.

SAMUEL KAHN, M D

Blair, V P, Brown, J B, and Byars, L T. Plantar Warts, Flaps, and Grafts. *J Am M Ass*, 1937, 103 24

A plantar wart or the hard scar resulting from the treatment of a plantar wart may be so painful as to make normal walking next to impossible. In addition, the prolonged use of a resultant unnatural stance may lead to secondary changes which may be annoying after the removal of their primary cause.

Plantar warts are not uncommon and are probably not all of similar origin. Some are radiosensitive while others are radioresistant. Radiation within the limits of safety is the best plan of treatment, but excessive radiation is often disastrous. If radiation is unsuccessful, excision and suture or cautery excision is the method of choice. Crippling results may follow the use of chemicals on over-irradiated tissue.

In cases demanding repair of defects of the plantar surface of the foot several plans may be utilized. A pedicle flap which includes the skin and some padding can be taken from a non weight bearing portion of the sole, and the resultant defect covered with a skin graft. If skin alone is missing and the underlying fat pad is sufficient, the application of a thick split graft is adequate. Even when there has been wide spread loss as from a burn, a free graft with the subsequent use of a fine meshed rubber insole, is often adequate. Skin and fat flaps from the opposite leg or thigh are usually dissatisfactory in their subsequent weight bearing ability.

In cases of persisting painful scars and callouses the patient should be given the benefit of orthopedic treatment. If this is unsuccessful after a reasonable time, surgical elimination of the lesion and replacement with a fat bearing, plantar flap will be most successful in certain cases.

JOHN T BYARS, M D

Theis, F V. Subungual Neuromyoma-Arterial Glomus Tumor of the Toe. Effect of Increased Peripheral Temperature. *Arch Surg*, 1937, 34 1

Neuromyoma arterial glomus structures are peculiar angioma like collections of microscopic blood vessels normally found in the corium and subcutaneous tissue. They are considered peripheral arteriovenous anastomoses which maintain a constant capillary pressure and control peripheral temperatures. The normal glomus structures are unequally distributed over the surface of the body, being most numerous on the fingers and toes. When there is local hyperplasia of a glomus, a small exquisitely tender, bluish nodule results. Clinically, such a tumor is associated with paroxysms of extremely severe pain, either localized or radiating. It is peculiar that hyperplasia with resulting tumor formation is found most frequently in regions where the normal glomus units are least numerous. Trauma is the only etiologic

factor of significance a history of injury being elicited in about 50 per cent of the cases. The benign character of the tumor is substantiated by the fact that no recurrences have been reported after local excision. The tumor is not known to metastasize and is not invasive in its growth although definitely demonstrable encapsulation is not always present.

Certain authors have reported the production of paroxysms of pain in cases of glomus tumor by the application of heat while others report the same result by the application of cold. In the first case the congestion of the blood spaces causes pressure on the surrounding nerves while in the second the contraction of the muscular walls of the glomus vessels probably compresses the nerve fibres between them. In these 2 ways pain may be produced.

The author reports in detail a case of subungual glomus tumor of the toe occurring in a patient suffering from senile arteriosclerotic peripheral vascular disease. The tumor was not discovered until the patient developed the classical symptoms of excruciating pain and tenderness of the toe. These symptoms were noted for the first time after the peripheral circulation began to improve as the result of alternating positive-negative pressure therapy. The improvement of the peripheral circulation was substantiated by the disappearance of the symptoms of coldness and claudication and an increase of the surface temperature. The tumor apparently caused engorgement of the glomus capillaries and thus gave rise to symptoms. It was excised with complete relief.

An extensive bibliography is appended to the article.  
ARTHUR S. W. TOROFF, M.D.

Turner G. G. The Debatable Land in the Management of Malignant Disease. *Proc Roy Soc Med Lond* 193, 30 301.

The author observed several patients with long standing irritative conditions which were not followed by cancer whereas other patients had developed cancer obviously without irritation. This suggests that there are many factors which may produce cancer yet fail to do so in the great majority of instances. Sir Thomas Oliver has pointed out that among the tar workers of Tyneside it is only after exposure for fifteen or more years that epithelioma appears. It is probable that a specific irritant can act only if the conditions of body resistance are favorable so that the cause appears to be the interaction of two factors rather than the action of either one alone. Yet while there are many patients in whom cancer does not develop in spite of what appear to be favorable conditions there are others in which malignant disease in some form will arise.

It cannot be said that cancer is the consequence of local senility rather than general senescence. One factor which may be overlooked is the ever increasing unrest both mental and physical of people in general nowadays. Most observers are agreed that persons who live the most quietly and have the most calm and cheerful outlook are those least likely to suffer from malignant disease.

The onset of malignancy following leucoplakia of the tongue occurs in 100 per cent of the cases but there are other carcinomas of the tongue which do not follow such precancerous conditions. It may be that leucoplakia is often the precursor of cancer but it is clear that epithelioma can occur as frequently and presumably as readily, in its absence. It is shown that only about 15 per cent of the cases of cancer of the stomach follow an ulcer in the remaining 85 per cent some other explanation must be found. It is now suggested that gastritis is almost invariably a precursor of cancer in the stomach but unless cancer exists without causing symptoms this suggestion is not in accord with the author's own clinical experience. It is usual for patients to say that they have always been perfectly healthy without a vestige of stomach trouble and able to take any form of food with impunity. Cancer in other locations is found repeatedly in big strong healthy looking people.

There can be no doubt of the association of malignant disease with papilloma and close association is noted in the rectum particularly. Nevertheless the relationship has not been explained and there must be some factor other than the presence of the papilloma that will account for the development of malignancy.

The size and bulk of a tumor is not necessarily a guide to its malignancy. In fact the large and strikingly obvious tumor may be evidence of the success of the local defensive mechanisms which have put up a great deal of resistance in that particular case. The reverse is certainly true and there is no justification for assuming that because a growth is small and new it necessarily offers the best prognosis. In the breast the stomach the gall bladder and the mouth the author has sometimes seen the smallest tumors treated by the most radical and thorough operative measures and yet they were followed by an early and extensive local recurrence or dissemination. He concludes that the cases in which there has been time for the growth to stimulate the surrounding tissue to produce all of its defensive mechanisms will respond most favorably to surgical treatment.

Concerning the diagnosis of malignancy it cannot be stated too emphatically that any inflammatory condition which may complicate the diagnosis should respond to treatment within a fortnight, and if improvement is not certain then there should be no further delay in determining whether malignant disease is present.

In abdominal conditions the author emphasizes the great significance of hemorrhage and slight obstructive attacks. For years he found these symptoms constantly associated with malignant disease long before the malignancy was known. With the resources for diagnosis now available he has often discovered a growth in the stomach or in the bowel in spite of which he found the patient to be apparently perfectly well and free from all anxiety for long intervals.

For the most part the diagnosis of malignant disease is not difficult, and becomes more a question of the extent of the disease and its possible spread. Time and repeated examinations are required for these determinations and hospitalization is important. A correct and complete diagnosis cannot usually be made at a first and hasty visit in the consulting room.

There is no harm in cutting into a tumor for biopsy if the complete operation can be done shortly after. Too thorough manipulation of a tumor in order to make a diagnosis is harmful. In the hollow viscera it is essential not to cut into growths *in situ*. Tissues invaded by growths do not heal readily, and disastrous results from peritonitis have occurred when a cut into a growth in some viscus has been made. An outlying nodule on the peritoneum, or a gland as near to the growth as possible should be selected for biopsy.

The author states that as yet there is no effective means of altering the constitution of the parts so that cancer will disappear, and until that can be brought about we must rely on local treatment. He believes that eventually the management of malignant disease will resolve itself into some form of hemotherapy. While the chemical preparations that have been tried from time to time, have fallen far short of cure they have at least proved that they have some influence.

With regard to treatment in general, the author does not recognize any competition between radium and surgery. He believes that eventually the scope of each will be defined. Surgery is still most important in the treatment of cancer in most locations but radium is perhaps superior in some locations. For the most part the management of cancer is the treatment of the lymphatic areas, and a great many failures have resulted because surgical treatment was rejected. A great number of cases have been seen in which a primary focus in the lip, the tongue, or the vulva had been treated efficiently with radium but the patient died as a result of invasion of the glands which did not respond to the radiation and had not been treated surgically.

In every case thorough treatment by irradiation or surgery should be given and in many cases it is a question of radium for the primary focus and surgery for the path of probable malignant invasion.

In discussing the results of operative treatment of cancer in general the author reports that 13 per cent of the patients with breast cancer were alive and well at the end of ten years. Many patients with rectal and bowel carcinoma were alive up to thirty years after operation. In gastric cancer gastrectomy is not curative but palliative. Case reports are given of sarcoma of the jaw and long bones.

After many years of experience and consideration, the author believes that the not infrequent success in treating cancer is the result of complete removal.

The aim of the operator should be to remove the whole of the affected part together with a wide area

of healthy tissue and the path of probable malignant invasion. The first essential is to have a proper conception of the extent of the proposed interference, and then so to plan the incisions that the parts are thoroughly exposed.

It is just as essential for the operator to have a good exposure when operating for cancer on the outside of the body as in the abdomen, for the parts to be removed must be seen clearly and there must be no rough handling for purposes of exposure. The exact extent of the wide area of healthy tissue to be removed has not yet been defined but it must not be limited too much. Of course this rule applies only to malignancy in certain locations like the breast, the extremities, and the surface of the body generally, quite obviously when malignant growths about the mouth and certain of the abdominal viscera are removed, the excision is limited by the demands of preservation of the function or simply by the anatomical relationships. For instance in dealing with the bowel, where malignant disease is fortunately not so virulent, it is commonly agreed that if one divides the bowel 3 or 4 in. above and 2 in. below a growth the area removed is sufficiently wide to fulfil the indications.

The lymphatic area to be removed must include not only the lymph glands that may be involved, but all the soft tissues in which they lie and the intervening lymphatic channels between the primary growth and such glands. No operation upon the body offers a better opportunity for ideal excision than radical removal of the breast and it should be used as a model for all interference of this sort. Every operation for cancer should be so planned that the tissues to be excised are demarcated at the outset and great care should be taken to remove the whole of such demarcated tissues before the operation is concluded. It is also essential that such removal should be *en bloc* and not piecemeal. The maximum removal of tissue should be nearest the lesion. In the necessary manipulation there should be no squeezing of the growth, handling of the tumor tissue should be avoided, and as little trauma as possible should be inflicted on the surrounding parts. As the blood loss may be serious, the vessels should be caught before being divided. It is probably wise to take in the bite of the instrument such an amount of tissue as will include the accompanying lymphatics.

In order that the operation may be carried out thoroughly all manipulations must be deliberate. Good surgical treatment of cancer is bound to be time consuming. As to whether or not the tissues should be cleanly divided with cutting instruments or severed with some sort of cautery, the author believes that, if a sufficiently wide margin can be obtained sharp cutting is all that is required. However if the incision must be made near the growth, then the cautery should be used, so that malignant cells in the path of division will be either destroyed by the heat or strangulated by the inflammatory reaction which takes place.

JOHN J. NISLOFF, M.D.

Cramer W The Importance of Statistical Investigations in the Campaign Against Cancer *Am J Cancer* 1937 29 1

The experimental investigation of carcinogenesis has revealed a different and largely independent aspects of the cause of cancer the proximate cause which is the intimate cellular changes that take place when a normal cell becomes malignant, and the remote cause such as the various factors and conditions capable of bringing about this intimate cellular change. Cancer in man is a condition in which the end results are represented by the cancer mortality statistics but its origin is unknown. The mortality statistics are not likely to give any information regarding the proximate cause of cancer, but they are the most valuable and almost the only material available for the study of the remote causes of cancer in man. The statistics represent an enormous material comprising at least 200,000 cases every year. This figure was obtained from the countries in which reliable cancer mortality statistics are available and the material contains data which cannot be obtained from observations on animals either on account of the great number of observations required or because of conditions of life peculiar to man.

Occupational cancer is cancer in which the remote cause has been identified from an analysis of the statistical data. This form of cancer has become preventable.

Statistical analysis of the cancer mortality according to the organs and age groups affected shows that cancer is not a disease with a common remote cause but with causes which vary from organ to organ. In some organs the frequency of cancer has diminished in some it has remained stationary and in still others it has increased. The increase is found in the older age groups while in the younger age groups the incidence has remained stationary or has diminished.

Further analysis of the cancer mortality statistics has shown that the incidence of cancer in exposed locations rapidly increases as the social scale is descended. Most of the deaths are the result of cancer in exposed locations. Therefore, some of the remote causes are to be found among the habits and conditions of life of the lower social classes and can be avoided. Therefore, a large fraction of the total cancer incidence is preventable. In fact, some cancers have been classified as 'social cancers' and 'occupational cancers'. If occupational cancer is preventable the social cancer which represents a large share of the total cancer mortality should also be preventable.

A comparison of the cancer mortality statistics from different countries demonstrates the exceptional frequency of primary liver cell cancer, which is always associated with cirrhosis of the liver among natives in the Far East the exceptional frequency of uterine cancer coupled with an exceptional rarity of breast cancer in Japanese women, and the exceptional frequency of cancer of the oesophagus in men in Switzerland.

Our present knowledge of the importance of hereditary factors in the cause of cancer can perhaps be best summarized as follows: cancer as a disease is not inherited, only the susceptibility to its development in response to persistent carcinogenic stimuli can be inherited.

Cancer mortality statistics if reliably collected, analyzed, and corrected, are valuable for identifying some of the remote causes of cancer in man. In other words, they are a means of transforming cancer into a preventable disease in a large number of cases.

JOSEPH K. NARAY MD

Gentile F Transplantable Cancerous Ascites of the Mouse (*Sull ascite cancerosa trapiantabile del topo*) *Tumors* 1936, 22 544

Gentile studied the cellular composition of the peritoneal exudate formed in white mice under the influence of different stimuli (Ehrlich's adenocarcinoma, normal mouse liver, and a combination of the 2 inoculated simultaneously). He also studied the effects of subcutaneous inoculation of cancerous ascitic fluid and the histological changes in the organs in the various experiments.

Intraperitoneal inoculation of Ehrlich's adenocarcinoma produces typical tumor nodules, ascites and microscopic lesions in most of the abdominal organs. In the liver it produces activation of the reticulo-endothelial system, subcapsular infiltration and vacuolization of the liver cells. The kidney shows hyperplastic changes in the glomeruli and cloudy swelling and vacuolization of the cells of the tubules. The follicles of the spleen become hyperplastic. Intraperitoneal inoculation of the liver produces ascites and the same type, although milder of degenerative inflammatory changes in the organs as produced by intraperitoneal inoculation.

The exudate (18 hours after inoculation) is cytologically identical in both instances. It consists of small medium sized, and large mononuclear cells. This fact demonstrates that the cancer cell shows no specific morphological characteristics in the exudate. Cells with protoplasmic processes which Waterman and Gates believe to be cancer cells are found also in ascites due to liver suspension.

Successive inoculations of cancerous ascitic fluids were performed. Exudates from animals in which an intraperitoneal tumor mass was growing retained the capacity of reproducing both tumor and ascites on successive inoculations while exudates from animals in which growth of the tumor had ceased caused neither ascites nor tumor formation. If the cells in the exudate were dissolved by distilled water, the inoculation had no effect.

Subcutaneous inoculation of cancerous ascitic fluid produced a local tumor in only 1 instance. However subcutaneous inoculation of the tumor at the site of a previous injection of ascitic fluid was always successful as well as subcutaneous inoculation of tumor suspended in ascitic fluid.

These results do not confirm the hypothesis that the ascitic fluid formed after intraperitoneal inoculation

lation of Ebrlich's carcinoma is the result of a distinctive form of tumor. The fluid is simply the peritoneal response to homologous cellular material. The supposedly transmissible ascites has no particular characteristics, it represents only a means of transmission of the tumor. M. E. MORSE, M. D.

Kaplan, I. I., and Rubinfeld, S. Sarcoma of the Soft Tissue. *Am J Roentgenol*, 1937, 37, 53.

During the period from 1924 to 1934 there were admitted to the Radiation Therapy Service at Bellevue Hospital, New York, 3,750 new cases of malignant disease. Of these, 162 or 4.3 per cent were classified as sarcomas and 78 or 4.7 per cent were classified as soft tissue sarcomas after clinical and pathological study. This group includes only those tumors originating in the skin, muscle, or fascial structures which manifested themselves on, or eventually infiltrated through, the skin. It appears that sarcoma rather than carcinoma has been associated most often with a traumatic origin. Coley and Higginbotham did not hesitate to connect the factor of trauma with neoplastic growth by the microorganism theory. One case reported by the authors seems to lend some support to such a theory. It may be that the important factor is chronic irritation, rather than acute single trauma. In the authors' series, 10 patients, or 13.1 per cent, gave a history of trauma.

Forty four patients, or 56 per cent, were in from the third to the fifth decade. This incidence runs more or less parallel to the general occurrence of malignancies. About one fourth of the patients (21.9 per cent) were less than thirty years of age. This is a relatively high incidence in the young as compared with other types of malignancy. The youngest patient was two, and the oldest seventy-five years old. Fifty five patients, or 70 per cent, were males, and 23, or 30 per cent, were females, a ratio of 2.3 to 1. In the authors' cases, 41 per cent of the tumors occurred on the lower extremities, the thigh was, by far, the most frequent site. From the therapeutic viewpoint, most of the cases were received long after neoplastic development had taken place. In most instances the gross appearance of the mass was the initial clinical symptom, with pain, bleeding, and disability as subsequent complaints. The authors describe the gross and microscopic pathological characteristics of the tumors under consideration.

All of the tumors in this series were removed surgically, wholly or partially, at some time during the period of observation. The form and mode of application of radium and roentgen therapy were so varied and individualized that it is impossible to chart the methods employed. In the control of recurrences the tumors proved sufficiently baffling to evoke all the means at the disposal of the authors. Whenever a mass was irradiated, the neighboring lymph drainage area also received proper irradiation. Roentgenograms of the lungs were taken of all the patients at frequent intervals to detect early evi-

dence of lung metastases. The area from which a mass was excised received either roentgen or radium therapy. Irradiation with high voltage roentgen rays was chosen for a large tumor bed, radium in needles, seeds, or on molds was used for smaller tumors. The electrocautery was employed for tumor removal whenever possible. Small nodular recurrences were usually implanted immediately with radium applicators.

In this series, 48 per cent of the tumors were of the spindle cell and fibrosarcoma types. Melanosarcoma proved to be the type of tumor which resulted in death earlier than the other types. Although patients with fibrosarcoma lived longest, they eventually succumbed. Myxosarcoma, also was a radiosensitive, favorable type of tumor. Spindle cell sarcoma, mixed cell sarcoma, and melanomas are very prone to produce metastases. Melanosarcoma disseminates generally throughout the body and especially to the liver and neighboring lymph nodes, spindle cell sarcoma tends to metastasize to the lungs, and mixed cell sarcoma usually metastasizes to the lungs. Amputation was performed in too few cases to warrant a conclusion as to its value. HAROLD C. OCHSNER, M. D.

Pinkus, H. The Isolation of Pure Strains of Cells from Human Tumors. II. Growth Characteristics of a Sarcoma and 2 Brain Tumors in Tissue Culture. Conclusions. *Am J Cancer*, 1937, 29, 25.

The author gives a detailed description of pure strains of cells isolated from 3 human tumors and cultivated from three to nine months. During this period gradual changes in the properties of the strains took place. The evidence that these cells made up the specific tumor elements is discussed. An explanation for certain differences between these strains of cells and cells from transplantable animal tumors is attempted.

The conclusions based on this material form a working hypotheses and present suggestions for further investigation. With this reservation in mind the following conclusions appear justified.

1. The tumors which because of their chemical importance were most commonly studied by former students, i.e., the squamous cell carcinomas, are probably least suitable for tissue culture.

2. Rapidly growing tumors forming dense areas *in vitro* offer the most successful results in culture.

3. Spontaneous malignant growths are composed of a genetically inhomogeneous and labile cell material.

4. Inhomogeneity and lability differentiate spontaneous tumors from transplantable malignancies in which the elements have been thoroughly stabilized by selection.

5. Inhomogeneity and lability account for a great part of the difficulties encountered in the cultivation of human tumors.

6. A careful selection of specimens, and a technique which is suitable for inhomogeneous and labile



material will probably make permanent cultivation of pure strains of human malignant cells possible

JOSEPH K. NARAY, M.D.

### GENERAL BACTERIAL PROTOZOAN AND PARASITIC INFECTIONS

Bock, H. E. Sepsis (Sepsis). *Klin. Wochenschr.* 1936  
2: 1138

Bock accepts as a whole Schottmueller's definition that sepsis is a bacterial general infection not caused by pus organisms exclusively (Leter). Leter's division into toxic and bacterial general infection is not entirely justified as a general intoxication takes place in all septic states. In agreement with Schottmueller and Bingold, Bock also rejects Leter's basic division into pyrogenic and putrid forms of bacterial general infection. The distinction is only of degree. From the standpoint of surgical treatment this division may have practical importance. Liech's definition of sepsis, that it is the expression of the failure of the defense forces of the organism, is also rejected. On practical grounds for clinical instruction, Bock holds firmly to the following formula: sepsis is present when within the body a focus has formed from which pathogenic bacteria pass into the blood stream either continuously or at intervals and by their entrance induce objective or subjective phenomena of disease. He therefore includes the specific infectious diseases among the causes of sepsis in agreement with Schottmueller. Abdominal typhoid, bubonic plague, and tularemia are examples of classical cases of lymphangitic sepsis. In addition to the specificity of the bacterium there is a certain specificity of the state of immunity. The importance of the specificity of the bacterium must not be overrated. For example, young infants are not susceptible to measles; furthermore, diseases of the mother do not pass to the fetus except in the last two months of pregnancy. Typhoid fever in the fetus is not the specific organic disease, but a generalized bacteremia, a sepsis. The difference between bacteremia associated with an infectious disease and sepsis in the adult is only a quantitative difference. On the other hand, it is more difficult to establish the difference between bacteremia and sepsis. One may perhaps accept Scholten's explanation. In bacteremia the phenomena at the focus of the infecting microorganisms are most prominent, while in sepsis the general symptoms are most prominent. Schottmueller distinguishes between (1) the portal of entry, (2) the focus of development of the sepsis, and (3) the daughter focus (metastasis). Without the inclusion of the vascular system there is no sepsis. According to Schottmueller, sepsis can never originate in the pleural or the abdominal cavity. Bingold has found that bacteria produce sepsis in the following order of frequency: aerobic and anaerobic streptococci and staphylococci, pneumococci, meningococci, enterococci, and colon bacilli. In the lung, on the other hand, found staphylococci to be in first place

in a series of 250 cases. Certain microorganisms which produce sepsis show a preference for certain septic foci. Staphylococci practically never travel by way of the lymph stream. The gas gangrene bacillus enters the blood stream only from lymphangitic processes. The hemolytic streptococcus may be present in all septic foci. The tendency to metastasize also varies. According to Bingold, anaerobic streptococci and gas gangrene bacilli rarely give rise to metastases, whereas 91 per cent of all cases of sepsis caused by staphylococci metastasize.

**Treatment.** Vaccine and serums are only auxiliaries. The only treatment that is certain is surgery, but unfortunately not all primary or secondary septic foci are accessible to the knife. Endocarditis, which is 100 per cent fatal, accounts for 12 per cent of all cases of sepsis; thrombophlebitis with a 75 per cent mortality, accounts for 60 per cent; a 3 lymphangitis with a 50 per cent mortality accounts for 10 per cent. In spite of these records, the Voss Clinic presents cures in 70 per cent and Kling in 60 per cent of the cases of postanginal sepsis treated by early operation.

**Symptoms.** Thrombophlebitic sepsis frequently gives rise to chills, whereas lymphangitic sepsis rarely causes chills but often presents intermitting or even continuous fever. From the practical standpoint, it is important to note that a metastasis can become a secondary focus of sepsis. The location of this focus must be discovered if possible. Bock agrees with Nathan that the relation of the sepsis is not as important to the general circulation as it is to the individual segments of the circulation. There are 4 such segments, each of which is closed by a capillary filter: (1) the venous segment terminating in the pulmonary capillaries, (2) the arterial segment extending from the pulmonary veins to the arterial portion of the capillaries in all types of organs, (3) the portal vein segment extending to the capillaries and lobules of the liver, and (4) the lymphatic segment. In the last the lymph nodes are the initial filter.

With an endocarditic septic focus, metastases visible to the naked eye can occur only in the general circulation, with a focus in the right heart only in the lungs. With a septic focus following angina, the location of the metastases can only be in the lung, with a septic thrombosis of the ilio-caval vein following appendicitis, only in the liver.

That the metastasizing sepsis possesses for each individual segment of the circulation a vessel-bound focus of development is an important advancement made from Schottmueller's teaching. (The original article contains a schematic drawing.) But when the capillary filter was passed in 25 cases of metastasizing sepsis, a secondary septic focus which was macroscopically discernible developed in 21.

In thrombophlebitic sepsis is in the area tributary to the vena cava there are usually secondary septic foci in the lungs, while in a primary pyelophlebitic

sepsis following suppuration of a diverticulum of the colon there must be a secondary septic focus in the liver if the sepsis progresses to the lungs. However, pulmonary abscesses of this origin are somewhat unusual, according to Bingold. It is only for the hepatophilic organisms, the Friedländer bacillus, Buday's organism and actinomycetes, that this filter is insufficient. Sepsis caused by Buday's anaerobic organism is of very rare occurrence in cases presenting infected wounds of bone. Tertiary and quaternary septic foci also occur.

The discovery of a septic focus is important. It is made easier by Friedemann's "Topo Diagnostik," which is based on the idea that the blood contains the maximum number of bacteria as it issues from the focus of infection. It is possible to determine which jugular vein should be ligated in post-anal sepsis by comparing the blood from the right and left veins of the neck. Furthermore, if on comparing the blood of the cubital artery with that from the jugular veins more bacteria are found in

1 c cm of the arterial blood than in 1 c cm of blood from both of the jugular veins together, then a fresh septic focus must already be present either in the lung or in the heart. Also, if blood is removed from the portal vein during the operation in a case of pyelphlebitis following appendicitis, and fewer bacteria are found in it than in the same quantity of cubital blood withdrawn at the same time, a further secondary septic focus is already present. This procedure deserves to be developed in practice. It permits definite conclusions, and limits or encourages further surgical measures. In general, it is always more promising to use arterial blood for blood cultures because at least 1 filter is eliminated. Bacteria can be best demonstrated in the bone marrow, even better than by the culture of venous blood. Bacteriemias can be demonstrated also by examinations of fresh urine by means of culture at the time the fever rises. The Schott mueller Bingold definition of sepsis and the emphasis on the septic focus are of outstanding practical value. (FRANZ) FLORENCE A. CARPENTER

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NOTE—THE BOLD FACE FIGURES IN BRACKETS AT THE RIGHT OF A REFERENCE INDICATE THE PAGE OF THIS ISSUE ON WHICH AN ABSTRACT OF THE ARTICLE REFERRED TO MAY BE FOUND

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# Liver, Gall Bladder, Pancreas, and Spleen

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JUNE, 1937

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*Supplementary to*  
Surgery, Gynecology and Obstetrics

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CONRAD BERENS  
OPHTHALMOLOGY

HAROLD I LILLIE  
OTOLOGY

LEE W DEAN  
LARYNGOLOGY

ADOLPH HARTUNG, ROENTGENOLOGY



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# INTERNATIONAL ABSTRACT OF SURGERY

JUNE, 1937

## ABSTRACTS OF CURRENT LITERATURE

### SURGERY OF THE HEAD AND NECK

#### HEAD

Williams, H. L., and Heilman, F. R. Spreading Osteomyelitis of the Frontal Bone Secondary to Disease of the Frontal Sinus, with a Preliminary Report as to Bacteriology and Specific Treatment. *Arch Otolaryngol*, 1937, 25, 196

The finding of the same organism, an anaerobic streptococcus, in two cases of osteomyelitis of the frontal bone, together with the apparently unusually favorable result obtained by specific therapy with an autogenous antiviral in these cases suggests that the organism responsible for the condition may have been isolated. It may explain why osteomyelitis of the frontal bone develops spontaneously or following operation in an occasional case of frontal sinusitis when it does not develop in other cases in which the bone is equally exposed to infection. The conjecture that the disease is of staphylococcal origin has not seemed satisfactory because staphylococci are frequently found in sinuses in which operation has not been followed by osteomyelitis of the frontal bone.

The authors believe it best to delay radical operation as long as is consistent with good surgical judgment, in order that the patient's natural resistance to the infection, which seems to be feeble, may be increased. The decision as to the optimal time for surgical intervention will be influenced considerably by the rapidity with which the inflammation spreads. In fulminating cases, in which meningitis and sepsis often appear from twelve to twenty-four hours after the first symptoms, radical surgery tends to hasten the spread of the disease. Therefore only enough should be done to relieve the pressure and drain the pus from the frontal sinus. When the fulminating stage subsides the surgeon should be guided by developments. The best guide to the extent to which the bone should be removed is the inflammatory change in the dura. It seems logical to treat the manifestations of the disease in the sinuses at the time of the removal of the diseased frontal bone. As Furstenberg and Mosher have demonstrated that

the disease is propagated by thrombosis of the dural veins which communicate with the dural sinuses and the intradural veins it would seem best to eradicate the primary disease in the bone before treating complications such as suppurative encephalitis or thrombosis of the dural sinuses.

Hinrichs, H. Osteomyelitis of the Maxilla (Ueber die Osteomyelitis des Oberkiefers). 1936. Kiel, Dissertation.

The frequency of occurrence of osteomyelitis in the region of the jaw depends upon what is meant by the term "osteomyelitis." According to Wustrow, osteomyelitis was present in 75 per cent of his cases in which there was a pathological change of the root canal contents with or without ensuing root canal treatment. According to a resolution of the German Society of Dental Anatomy and Pathology, every acute or chronic inflammation of the paradentium should be regarded as osteomyelitis. On the basis of this theory, every periodontal reaction following the filling of a root is to be regarded as osteomyelitis. The term "osteomyelitis" is therefore sometimes more, and sometimes less, inclusive, depending upon the conception of the condition by the person using it. Clinically, however, it is applied as a rule only to cases presenting chiefly the picture of bone marrow inflammation.

In the jaws as compared with the long bones, severe osteomyelitic conditions are rare. The author cites statistics which vary according to whether periodontitis or inflammatory swelling of the gums was included with osteomyelitis. Certain it is, however, that the mandible is more frequently involved by osteomyelitis than the maxilla. The author found 3 cases of typical osteomyelitis of the maxilla in the records of the surgical clinic at Kiel for the period from 1912 to 1933 and 3 others in the records of the North German Jaw Clinic at Hamburg.

Because of the differences of opinion, the pathogenesis of osteomyelitis of the jaw during infancy—

involvement of the maxilla is more frequent than in involvement of the mandible at that age—is not clear. Moreover with increasing age the incidence of osteomyelitis in the maxilla decreases rapidly and the mandible becomes more frequently involved (Wustrow). In the adult osteomyelitis of the maxilla usually begins in the teeth but sometimes is of hematogenous or traumatic origin. Worthy of note is the fact that when it is of traumatic origin it is rarely the result of severe injuries such as compound fractures or bullet wounds of the maxilla. This has not been explained (Wuhrmann). To what extent paradentosis (paradentitis marginalis) is to be included with osteomyelitic processes has not yet been determined (Wustrow).

The complications of osteomyelitic processes in the maxilla are well known. The prognosis is frequently serious. The surgical measures indicated depend upon the severity of the condition. In radical procedures in serious cases preliminary splinting should be attempted if possible. In all other cases caution is necessary in the removal of bone or teeth. A roentgenogram should always be made, if only for timely recognition of the disease. The method of postoperative bone substitution depends upon how a prosthesis can be held in place. An attempt at implantation—usually of ivory—should always be made.

The author reports in detail 6 cases, 2 of which were fatal. (GERLACH) HARRY A. SALZMAN, M.D.

Guszcik A. Osteomyelitis of the Mandible (Osteomyelitis der Mandibula). *Otolaryngol* 1936 26 538

Osteomyelitis of the mandible differs essentially from similar inflammations of the long bones. This fact is due to the anatomical structure of the lower jaw which is ill suited for prolonged encapsulation of pus such as occurs for example in the upper third of the tibia in the form of Brodie's abscess. In many places the wall of the lower jaw is thin. Moreover the alveolar portion has little resistance. The pus soon finds an outlet at a weak point in the bone.

It is now generally believed that the condition is usually an infection of the bone marrow from the blood stream. The staphylococcus pyogenes aureus plays the principal role but the disease may be produced also by streptococci, colon bacilli and other pathogenic organisms. The relationship between the virulence of the bacteria and the resistance of the body determines the outcome. Odontogenic infection can follow the various diseases of the teeth and is frequently a sequela of dental operations. It may be caused by even quite insignificant injuries such as trauma produced by a tooth pick. Diseases of the neighboring parts, inflammations of the skin and the soft parts, furuncle of the face, perioritis and eruption of the wisdom teeth often result in osteomyelitis.

The pathologic-anatomical basis of the disease is thrombosis of small arteries and veins by infected

blood clots. Traumatic osteomyelitis differs from hematogenous osteomyelitis and osteomyelitis occurring immediately after an injury must be differentiated from osteomyelitis due to the flare up of an old focus.

For correct diagnosis consideration of the clinical symptoms is necessary. Acute osteomyelitis is essentially an acute sepsis. During the acute stage laboratory studies are of importance. Of greatest diagnostic aid is the Schilling hemogram, although, of course, it is not advisable to draw conclusions regarding the prognosis from the blood picture alone. Also of great diagnostic importance is observation of the variations in the roentgen picture but it must be borne in mind that during the first five to seven days after the beginning of the infection no change is discernible. In order to follow the progressive process it is necessary to repeat the roentgen examination every two weeks. Among the important laboratory procedures is serodiagnosis since in from 80 to 90 per cent of the cases the condition is due to staphylococci, staphylococcus aureus is nearly always demonstrable in the blood. The greater the antitoxin content of the blood the better the prognosis.

In the differential diagnosis the following diseases must be ruled out: acute alveolar periostitis, apical periodontitis, marginal periodontitis, apical granuloma, tuberculosis, actinomycosis, syphilis, necrosis due to mercury or phosphorus, cysts, osteitis fibrosa, odontoma, adamantinoma and the Akhusen Wassmund granuloma sarcomatodes. Carcinoma of the lower jaw is generally secondary. Sarcoma—occurring in young persons—is of the periosteal type. Retention cysts following closure of salivary ducts may at times give rise to diagnostic error.

The most frequent complications of osteomyelitis of the mandible is abscess formation.

A favorable prognosis depends upon early correct diagnosis and treatment.

The mortality is relatively low except in the cases of nurslings and young children in which it is 25 per cent.

The principles of the treatment are the same as those of the treatment of osteomyelitis of the long bones. Conservative methods are always to be preferred. In the acute stages opening of the abscess is indicated. In the cases of children bone puncture opening of the marrow cavity, drainage and free chiseling out should be done. Subperiosteal resection is not advisable in acute cases.

The complications should also be treated surgically. Sequestromy should generally be done late from two to three months after the first operation. Surgical treatment should be supplemented by immunotherapy—vaccinotherapy, serotherapy, autophagotherapy and chemotherapy. In old cases the choice of operation depends upon the extent of the disease process and the patient's general condition. In the exposure of the interior of the bone care should be taken to limit removal of the periosteum.

to the minimum. In definite septicemia the mortality is from 49 to 76 per cent. For this condition, serotherapy, hemotherapy, and autophagotherapy have adherents and opponents. Many clinicians prefer chemotherapy. In addition to urotropin, dyestuffs, and metallic salts, the author has used intravenous and intramuscular injections of prontosil combined with dextrose with good results.

In general, the difficulties in the surgical treatment of osteomyelitis of the lower jaw may be diminished by the use of simple measures employed in dentistry. (E. ILLES) ROBERT H. IVY, M.D.

### EYE

Trowbridge, D. H., Jr. Sympathetic Ophthalmia. *Am J Ophth.*, 1937, 20, 135

This is a report based on microscopic study of the exciting eye in 32 cases of proved sympathetic ophthalmia with consideration of the relationship of the histological findings to the clinical course of the condition. The age incidence ranged from four and one half to sixty seven years. The longest time elapsing between the injury and the appearance of the disease in the sympathizing eye was nineteen years and the shortest twenty three days. While the condition nearly always follows a perforating injury, it may apparently be caused at times by blunt injuries and when a necrotic intra ocular tumor is present it may develop in the absence of trauma.

At the time of the outbreak of inflammation in the fellow eye, the vision of which may not be impaired, a soft, shrinking, exciting eye with great impairment or total loss of vision is usually found. From the standpoint of sympathetic ophthalmia, perforating wounds of the cornea or at the limbus are no less dangerous than wounds in the ciliary body. Unhealed wounds in any region are particularly dangerous. While the interval between injury and outbreak does not seem to be an important factor in the outcome of the sympathizing eye, a protracted interval between the onset of sympathetic inflammation and removal of the exciting eye affects the outcome in the fellow eye unfavorably. Photophobia, lacrimation, ciliary injection, cells in the aqueous and deposits on the posterior corneal surface or anterior lens capsule, usually accompanied by impairment of vision, are most common in the sympathizing eye. Neuroretinitis or sudden increase in refraction may be among early signs.

Sympathetic ophthalmia may develop following iridocyclitis and may occur in the presence of panophthalmitis. While the extent of the specific infiltrate surrounding the scleral emissaries is not of great prognostic importance, evisceration of the contents of the globe probably does not protect against the transfer of sympathetic uveitis to the fellow eye. In enucleation it would seem wise to remove as much of the optic nerve and attached extra ocular tissues as practicable. The prognosis cannot be based upon the extent or location of the specific infiltrate in the exciting eye.

Phagocytosis of pigment by the epithelioid cells of the infiltrate occurs to some degree in sympathetic ophthalmia, but the Fuchs-Dalen nodule is not necessarily the site of this activity. The extent of the pigment phagocytosis does not affect the prognosis. Eosinophiles and plasmacytoid cells may appear in the infiltrate. The author emphasizes the importance of removing foci of infection and of ultraviolet irradiation of the body as aids in the treatment of the disease. WILLIAM A. MANN, M.D.

### NECK

Paterson, D. R. Upper Dysphagia. *J Laryngol & Otol*, 1937, 52, 75

After presenting a brief review of the development of mechanical aids for examination of the upper food passage, Paterson discusses a type of dysphagia related primarily to a change in the upper esophageal mucosa, the nature of which is not clear. This condition is associated with secondary anemia and frequently with atrophic changes in the mouth, pharynx, and finger nails. It occurs in women in the reproductive age. Paterson suggests that it may have an etiological relationship to a constitutional factor, and emphasizes the not infrequent supervention of malignant disease in the post cricoid region, which occurs much more frequently and at an earlier age in women than in men.

JACOB M. MORA, M.D.

Talbot, F. B., Wilson, E. B., and Worcester, J. The Basal Metabolism of Girls. Physiological Background and Application of Standards. *Am J Dis Child*, 1937, 53, 273

The authors present a standard of normal metabolism for girls from birth to eighteen years of age, which is based on total calories per twenty four hours for weight corrected for age, rather than on calories per square meter per hour. The article is concluded with the following statements:

"When these various formulas are applied to a given group of normal children, it is found that whatever mathematical differences there are in the fits are insignificant, and it seems to us that the voluminous discussion of the pros and cons of one formula as compared to another are academic and have no bearing on clinical practice. We believe that the formulas merely express an accidental relationship and not a physiologic law. Mathematically, we found that the 'total calories for the weight' gave the closest fit of any method used for predicting calories for the groups of girls studied by us, and there is a certain amount of evidence that the same is true for boys. We cannot, therefore, see what advantage there is in multiplying with other factors or in estimating body surface, because any error in the original measurements may be intensified by so doing.

"We make an exception to this generalization in respect to age. We have found that an age correction of the weight prediction improves the correlation.

Since nearly all standards predict the metabolism of normal persons equally well, the selection of a standard for practical clinical use should depend on which standard gives the truest clinical picture for persons with abnormal and pathologic conditions. The problem has bothered many practical clinicians. We have attempted to apply this test to persons with conditions in which it will be most helpful and have presented evidence that the total calories for the weight gives the prediction desired.

The standards presented here are like all other standards averages. If they are used the coefficient of variability should always be kept in mind. They have the advantage of being direct measurements which require no formulas and are thus open to less possibility of accumulation of errors. They include new data which help to fill in the blank spaces of from 12 to 20 years and thus connect young childhood with adult life.

PAUL STARR, M.D.

Lewis, R. C. Kinsman G. M. and Hill A. The Basal Metabolism of Normal Boys and Girls from Two to Twelve Years Old Inclusive. *Am J Dis Child* 1937 33 48.

The author's summary is as follows:

As a report of progress (from the Child Research Council and the Department of Biochemistry, University of Colorado School of Medicine) in a longitudinal study of normal children, the results of 366 basal metabolism tests on 32 boys and of 271 basal metabolism tests on 41 girls, all between the ages of 2 and 12 years inclusive, are presented. The tests were made by means of the open circuit chamber method and the Carpenter-Haldane gas analysis apparatus.

The results are presented in a cross sectional manner, and the heat production is expressed as calories per hour referred to age, weight, height and surface area respectively, and as calories per hour per square meter of surface area, calories per hour per kilogram of body weight, and calories per hour per centimeter of total height, respectively, referred to age.

The means, the standard deviations from the means, and the coefficients of variation of the observed heat production for convenient arbitrary divisions of the variable to which the heat production was referred were computed for each of the specified methods of expressing the energy metabolism.

The mean coefficient of variation, a statistic which was used to indicate the degree of scatter of the individual tests, was found to be of increasing value in the following order:

#### Boys

1 and 2. Calories per hour referred to surface area, and calories per hour per square meter referred to age.

3. Calories per hour referred to weight.  
4. Calories per hour referred to height.  
5. Calories per hour per centimeter referred to age.

6 and 7. Calories per hour referred to age, and calories per hour per kilogram referred to age.

#### Girls

1. Calories per hour referred to weight.  
2. Calories per hour per square meter referred to age.  
3. Calories per hour referred to surface area.  
4. Calories per hour per centimeter referred to age.  
5. Calories per hour referred to height.  
6. Calories per hour referred to age.  
7. Calories per hour per kilogram referred to age.

This treatment of the data indicates that for the group of normal children under investigation 3 of the methods of expressing heat production, calories per hour referred to weight and surface area, respectively, and calories per hour per square meter referred to age, give the lowest degrees of dispersion.

The mean coefficients of variation for these 3 methods show that theoretically, 69.7 per cent (the percentage included within plus and minus 3 standard deviations from the mean) of all the tests should fall within  $\pm 18$  per cent of the mean for the boys and within  $\pm 16$  per cent for the girls, and that 95 per cent (the percentage included within plus and minus 2 standard deviations) should fall within  $\pm 12$  per cent for the boys and within  $\pm 11$  per cent for the girls.

Scatter diagrams for these 3 methods and for calories per hour referred to height were constructed, and in each case the central trend line was fitted either by the semi-average method or by inspection.

The central trend line values for calories per hour per square meter referred to age (Table 17) and for calories per hour referred to weight and to body surface, respectively (Tables 10 and 19) were tabulated in order that they might be available as prediction standards.

Even though they show somewhat greater dispersion than is the case with the 3 methods just mentioned, the central trend line values (Table 20) for calories per hour referred to height were also tabulated, since this method of expressing the heat production has found rather wide use in the literature.

"The relationship of the results of the present study to those reported by other workers was studied in detail by comparing the separate tests reported in the literature with the 4 central trend line values mentioned. Histograms of the percentage deviations were constructed. In cases in which the separate tests were not reported, the trends and levels of the results are shown graphically. The comparative results are discussed in detail.

This analysis of the results of basal metabolism tests on children reported in the literature demonstrates the significant effect of body build on the comparative values obtained for the basal metabolic rate by the several methods of reference. The importance of considering the relationship between the

literans, dyspnea due to severe emphysema, and cardiac asthma. All of the operations were done under local anesthesia. The postoperative administration of thyroid substance was found unnecessary. The dangers of the treatment consist of injury to the recurrent laryngeal nerve and the later development of tetany or myxedema. Transitory hoarseness is frequently due to edema of the glottis from the stasis following ligation of the veins.

While it cannot be assumed that abnormally placed parathyroids were present in all of the author's 17 cases, tetany developed in only 1 case and in this instance was mild and lasted for only two days. Therefore, in the performance of total thyroidectomy on patients with cardiac disease particular attention to the parathyroids is unnecessary. Severe manifestations of myxedema were also absent in the author's cases, evidences of this condition consisting at the most, of loss of hair, deepening of the voice and dryness of the skin. The reasons for the absence of late postoperative sequelae were not determined. The objective impression following the operation is always confusing. Histological examination does not always reveal a definite picture. The operation is contra indicated by a basal metabolic rate of from -20 to -30. Its late results encourage its further trial in cardiac and vascular conditions.  
(BRALN) LEO M. ZIMMERMAN, M.D.

Frenchner, P. Some Primary Results of the Operative Treatment of Carcinoma of the Larynx (Einige Primäresultate bei operativer Behandlung von Kehlkopfkrebs). *Stenisk Lakartidn*, 1936, p. 1120.

The author discusses generally the operative and radiobiological treatment of laryngeal carcinoma. The indications have been divided into 4 groups suggested by Soerensen. Concerning the results of laryngectomy the statistics of Gluck Soerensen, Tapia and Weber are quoted. The results of radium therapy are shown by the statistics of Coutard (1933), Edling (1934), Schantz and Zuppinger (1934), and Weber (1931). The discussion of preoperative radium therapy has not yet been concluded. Preoperative radium therapy may offer some advantages, but its advantages have been seen during the operation.

At the Sahlgrenska Hospital in Sweden, the operative procedure of Gluck Soerensen was formerly followed. In the last few years the author used the technique of New (Mayo Clinic) in 14 cases, i.e., the 2 or 3 stage operation. In the first stage a midline incision is made with dissection of the entire larynx and the first two tracheal rings, followed by closure of the wound. After four days a tracheotomy is done, but the wound is not opened further than is absolutely necessary. After another four days, laryngectomy is done from below upward. As soon as the larynx is separated from the trachea a tampon tube with an inflating bulb is inserted into the trachea (Frenchner, *Acta Otolaryngol*, Supp. 20). After the operation, a relatively large tracheotomy tube is inserted.

The author then discusses the advantages and disadvantages of the single stage and multi stage procedures. He states that his fourteenth case, with anterior perforation of the cancer, was operated upon in a single stage. The ages of the 14 patients varied between twenty nine and sixty eight years. Twelve survived the operation and are still alive without recurrence. One died on the seventh day after the operation from pulmonary hemorrhage, while a second died on the fourth day from a phlegmon of the neck. In the last case the feeding tube had been displaced by coughing and it took an hour to replace it by manipulation. Autopsy revealed that the tube had broken through the pharyngeal suture and penetrated into the soft tissues on the right side of the neck.

The postoperative healing time was from two to three weeks in the uncomplicated cases, and some what longer in the 2 cases with pharyngeal fistulas. In 1 case which was treated preoperatively with radium, necrosis of the skin and subcutaneous tissue occurred. In 2 cases there was severe bronchitis with a cough which disrupted the skin and trachea sutures. The feeding tube was usually left in place for two weeks. The primary, cosmetic union was good in all of the cases observed until complete healing occurred. In 8 cases voice training (esophagus voice) was started, good results were obtained in 5 (1 patient was a train conductor), poor results in 2, and a completely negative result in 1.

(GERLACH) WILLIAM C. BECK, M.D.

At the Sabbathsberg Hospital in Sweden, the operative procedure of Gluck Soerensen was formerly followed. In the last few years the author used the technique of New (Mayo Clinic) in 12 cases, the 2 or 3 stage operation. In the first stage a midline incision is made with dissection of the entire chest wall and the wound closed after 4 or 5 days, as done, but the wound is not opened further than after another four days, as done from below upward. As soon as the larynx is separated from the trachea a tamponade with an iodoform gauze is inserted into the trachea (Freischlager, *Acta Otolaryng.*, Supp. 20) After the operation, a relatively large tracheostomy

The first stage of the disease is a general  
 malaise, with loss of appetite, and  
 a feeling of weakness. This is followed  
 by a more severe stage, with  
 fever, and a more pronounced  
 weakness. The third stage is  
 the most severe, with a high  
 fever, and a more pronounced  
 weakness. The fourth stage is  
 the most severe, with a high  
 fever, and a more pronounced  
 weakness. The fifth stage is  
 the most severe, with a high  
 fever, and a more pronounced  
 weakness. The sixth stage is  
 the most severe, with a high  
 fever, and a more pronounced  
 weakness. The seventh stage is  
 the most severe, with a high  
 fever, and a more pronounced  
 weakness. The eighth stage is  
 the most severe, with a high  
 fever, and a more pronounced  
 weakness. The ninth stage is  
 the most severe, with a high  
 fever, and a more pronounced  
 weakness. The tenth stage is  
 the most severe, with a high  
 fever, and a more pronounced  
 weakness.

1. The first step is to identify the problem. This involves understanding the symptoms and the context in which they are occurring. It is important to gather as much information as possible, including a detailed history of the problem and any relevant factors that might be contributing to it.

The dangers of the treatment consist of injury to the recurrent laryngeal nerve and the later development of tetany or myxedema. Transitory hoarseness is frequently due to edema of the larynx from the stasis following ligation of the veins. While it cannot be assumed that abnormally

placed parathyroids were present in all of the author's 17 cases, tetany developed in only 1 case and in this instance was mild and lasted for only two days. Therefore in the performance of total thyroidectomy on patients with cardiac disease particular attention to the parathyroids is unnecessary. Severe manifestations of myocardopathy were also absent in the author's cases, evidences of this condition consisting at the most, of loss of hair, decaying of the voice, and at times of the skin. The reasons for the absence of late postoperative sequelae were not determined. If the objective impression following the operation is always confusing, histological examination does not always reveal a definite picture. The operation is contraindicated by a basal metabolic rate of from -30 to -40. Its late results encourage its further trial in cardiac and vascular conditions (Barr), Leo M Zuckerman, M D

Fräncher P. Some Primary Results of the Operative Treatment of Carcinoma of the Lung (Einzige Primärrisultate bei operativem Behandlung von Kehlkopfkrebs) *Stenok Lokazidn*, 1936 p 1120

The author discusses generally the operative and radio-biological treatment of large and carcinoma. The indications have been divided into 4 groups suggested by Soerensen. Concerning the results of ingested radium the statistics of Glück Soerensen, Tapa and others are quoted. The results of Radium therapy are shown by the statistics of Couraud (1933), Ehling (1934), Schmitz and Zupfinger (1933) and Weber (1931). The discussion of operative radium therapy has not yet been conducted. The operative radium therapy may offer some advantages, but disadvantages have been seen during the operation.

Munro, D., and Wegner, W. Primary Cranial and Intracranial Epidermoids and Dermoids. *Aes England J Med*, 1937, 216 273

After citing the various names applied in the literature to cholesterol containing tumors found in the cranium which are commonly called "cholesteatomas," the authors report a primary cranial epidermoid involving the frontal bone, a primary intracranial epidermoid of the parietal lobe, and a primary intracranial dermoid of the cerebellum.

They suggest that the term "primary cranial epidermoid" be applied to true epidermoid lesions occurring in the diploe and to primary intracranial epidermoid or dermoid lesions reproducing ectodermal epithelium in the brain or meninges.

ROBERT ZOLLINGER, M D

Adam J., and Connal, E. A. M. Purulent Meningitis Nine Consecutive Cases with 7 Recoveries. *J Laryngol & Otol*, 1937, 52 87

In 9 cases of purulent meningitis complicating middle ear suppuration the following clinical signs were almost uniformly present: headache, fever, stiffness of the neck, Kernig's sign, and a purulent cerebrospinal fluid under pressure and with increased globulin. The authors do not believe that a positive culture of the cerebrospinal fluid is necessary for the diagnosis of purulent meningitis. They cite cases in support of their opinion.

In the treatment of purulent meningitis complicating middle ear disease they perform a thorough mastoidectomy with removal of the tegmen tympani and exposure of the lateral sinus. When indicated, vestibulotomy is done. The dura having been exposed, a linear slit is made in it as near as possible to the supposed focus of intracranial infection to permit drainage of the abscess or localized meningitis. Drainage is therefore established through the mastoidectomy wound. Regular lumbar punctures are done, and in some cases from 10 to 30 c cm of air are injected through the lumbar needle according to the method of Mayer. In most cases pontitis is given by mouth or intramuscularly, and antiscarlatinal serum intrathecally or intramuscularly.

In one of the cases reported a temporosphenoidal abscess was probed through an opening in the necrotic dura for a week following mastoidectomy. In several cases, bone in the region of the tegmen was removed at a second operation, the first operation not having been complete enough. In another case the dural slit was parted with forceps the day after it was made and a drain was introduced. The drain was left in place for twenty seven days.

JOHN MARTIN, M D

#### PERIPHERAL NERVES

Moene, I. Peripheral Nerve Tumors (Periphere Nerven-tumoren). *Med Rev Bergen*, 1936, 53 61

The ectodermal neurinomas occur in the central nervous system and the spinal ganglia, and also

stand in a certain relationship to the sympathetic nervous system. They usually occur singly, and in this respect are in contrast to the neurofibromas, which are generally multiple. They stain yellow with the van Gieson test, while on the other hand, the neurofibromas stain red. In addition, the spindle shaped nuclei in the neurinomas are arranged in bundles or rows with a fibrillary interstitial substance. The neurofibromas consist chiefly of connective tissue. The former are completely benign, whereas the latter frequently degenerate into sarcoma. Both forms may occur in a mixed tumor. Von Pecklinghausen's disease is not as yet completely understood. The author is of the opinion that nerve tumors and von Pecklinghausen's disease are of a genetically similar origin and may be designated as systemic diseases. However, the so called amputation neurinomas are not true tumors, but rather represent regenerating nerve fibers and perineural and epineural tissue growth. Primary sarcomas, hemangiomas and cysts or ganglions are very rare nerve tumors. Peripheral nerve tumors may occur anywhere in the entire body, but they have certain sites of predilection. The diagnosis is not always easy. It is especially difficult when only one tumor is present. The prognosis for neurinomas is good, but that for neurofibromas is doubtful because of the possibility of malignant degeneration. The danger of malignant recurrence is especially great following operation. The treatment may be exclusively surgical, nevertheless, all nerve tumors do not require an operation. The author discusses 4 cases of neurinoma and neurofibroma which he observed. All 4 tumors were removed surgically with good results.

(HAAGEN) HARRY A. SALZMANN, M D

Bonola, A. Brachial Plexus Paralysis Following Motorcycle Accidents (La paralisi del plesso brachiale da traumi di motocicletta). *Chir d organi di movimento*, 1936, 22 309

For a clear understanding of the pathogenesis of brachial plexus paralysis following motorcycle accidents it is necessary to have some knowledge of the topography of the brachial plexus in its relation to the spinal column and the movements of the shoulders.

The intrachordian portion of the roots of the brachial plexus varies in length, that of the fifth and sixth cervical roots being  $\frac{3}{4}$  cm, that of the seventh and eighth cervical 1 cm, and that of the first thoracic,  $1\frac{1}{2}$  cm. The extrachordian portions of the roots form a triangle the base of which is formed by the lower cervical vertebrae, the upper side by the fifth cervical root, and the lower side by the first thoracic root. The apex of the triangle is at the level of the seventh cervical root which in its path bisects the triangle. In infants, the roots pass through the intervertebral foramina horizontally and form no angles. In adults, the fifth and sixth cervical roots form obtuse angles opening downward, the seventh cervical root is almost horizontal, and the



# SURGERY OF THE THORAX

## CHEST WALL AND BREAST

Keeley, J. L. Tuberculosis of the Breast *Ann Surg.* 1937, 105 169

The authors report 4 cases of tuberculosis of the breast in women. In 1, the condition was bilateral, and in 2 it was primary in the breast. Whereas tuberculosis of the breast has been considered rather unusual, the authors believe that, with increased operations for supposed early cancer, it may be found more frequently. In discussing the possibility that the infection may be carried to the breast by the blood stream or the lymphatics, they express the opinion that this is less likely than that the disease develops in an area of lessened resistance.

The early symptoms and signs vary, but in most instances a lump in the breast is noted first. Few patients complain of pain. The nodule in the breast may remain localized, or several lumps may develop, coalesce, and form a caseous or abscessed area leading to sinus formation. The skin overlying the lesions may present the "orange peel" change seen in carcinoma. As the inflammation extends, redness and heat occur. Later, the axillary lymph glands may become involved. Frequently the diagnosis can be made only by microscopic examination. The treatment advised is surgical excision with axillary gland dissection if the latter is indicated.

G. DANIEL DELPRAT, M.D.

Limburg, H. The Histological Diagnosis and the Prognosis of Newgrowths of the Breast (Zur histologischen Diagnose und Prognose von Neubildungen in der Mamma) *Ztschr. f. Geburtsh. u. Gynäk.* 1936, 114 7

The frequency with which carcinoma develops from benign newgrowths of the breast, especially the cystic breast, can be determined only by clinical investigations extending over a long period of time.

The author reviews the findings of a follow up of 335 patients treated for benign tumors of the breast including 78 with cystic breast. The follow up was made from five to ten years after a biopsy diagnosis of benign tumor. One hundred and twenty eight of the patients were found free from recurrence and symptoms. Of the 7 who were dead, only 1, a patient who had had cystic disease, had died of carcinoma of the breast. In 11 cases radical operation with removal of the axillary glands had been performed. In the others, nothing besides biopsy or excision of the palpable tumor had been done. In no case had histological examination demonstrated a definite carcinoma, although frequently it had revealed intracystic epithelial proliferations of the type which have often been designated by other investigators as precancerous.

As carcinoma developed in only 1 of the reviewed cases, a case of cystic breast, and all of the other

tumors, most of which were not treated by radical operation, proved to be benign, the general belief that the incidence of carcinoma in cystic breast ranges from 25 to 50 per cent is incorrect. The author presents illustrations to show that high grade proliferations in adenofibrosis of the breast may run a benign course.

(From the) J. DANIEL WILLEMS, M.D.

Cohn, L. C. Paget's Disease of the Female Breast, with Special Consideration of Biopsy and Pre-Operative Irradiation *Arch. Surg.* 1937, 34 201

From additional experiences since Bloodgood's report in 1924 and the observation of 5 cases of Paget's cancer of the nipple in the last two years, the author draws the following conclusions:

There may be no difference clinically between a small, apparently insignificant lesion of the nipple which is benign and one which, under the microscope, is found to be a fully developed Paget carcinoma. When a lesion of the nipple does not heal in a few weeks under treatment by simple cleansing and protective measures, biopsy should be performed.

For biopsy on a lesion on the nipple complete excision of the nipple, the areola, and the central zone of the breast beneath should be done.

Fully developed cancer of the nipple may be present without the presence of a fissure or an ulcer. There may be only slight keratosis surrounded by an area of irritation, the entire apparently innocent lesion being limited to the nipple.

When microscopic study of the sections shows Paget's carcinoma, operation for complete removal of the breast should follow.

Delay of the complete operation after biopsy of the type described, in order to carry out thorough pre operative irradiation of the supraclavicular area, axilla, and breast is apparently associated with no danger.

When an ulcer on the nipple is associated with a palpable mass in the breast or with palpable axillary glands there is no danger in delaying the complete operation for one course of pre operative irradiation. There is nothing to be gained by biopsy in such cases.

Since, under irradiation, an ulcer which is the seat of cancer may heal over entirely so that the cancer in the breast and axillary glands remains unrecognized, there seems to be a distinct danger in irradiation of an apparently insignificant lesion of the nipple without a previous biopsy unless the irradiation is to be followed by a complete operation.

Restriction of the operation to excision of the nipple, areola, and central zone of the breast beneath is justified only on the basis of expert pathological knowledge. If there is doubt as to whether the lesion is malignant while the sections are being sub-

# SURGERY OF THE THORAX

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As carcinoma developed in only 1 of the reviewed cases, a case of cystic breast, and all of the other

tumors, most of which were not treated by radical operation, proved to be benign, the general belief that the incidence of carcinoma in cystic breast ranges from 25 to 50 per cent is incorrect. The author presents illustrations to show that high grade proliferations in adenofibrosis of the breast may run a benign course.

(FROBOESE) J DANIEL WILLEMS M D

Cohn, L C. Paget's Disease of the Female Breast, with Special Consideration of Biopsy and Pre-Operative Irradiation. *Arch Surg*, 1937, 34 201

From additional experiences since Bloodgood's report in 1924 and the observation of 5 cases of Paget's cancer of the nipple in the last two years, the author draws the following conclusions:

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# SURGERY OF THE THORAX

## CHEST WALL AND BREAST

Keeley, J. L. Tuberculosis of the Breast *Ann Surg.* 1937, 105 169

The authors report 4 cases of tuberculosis of the breast in women. In 1, the condition was bilateral, and in 2 it was primary in the breast. Whereas tuberculosis of the breast has been considered rather unusual, the authors believe that, with increased operations for supposed early cancer, it may be found more frequently. In discussing the possibility that the infection may be carried to the breast by the blood stream or the lymphatics, they express the opinion that this is less likely than that the disease develops in an area of lessened resistance.

The early symptoms and signs vary, but in most instances a lump in the breast is noted first. Few patients complain of pain. The nodule in the breast may remain localized, or several lumps may develop, coalesce, and form a caseous or abscessed area leading to sinus formation. The skin overlying the lesions may present the "orange peel" change seen in carcinoma. As the inflammation extends, redness and heat occur. Later, the axillary lymph glands may become involved. Frequently the diagnosis can be made only by microscopic examination. The treatment advised is surgical excision with axillary gland dissection if the latter is indicated.

G DANIEL DELPRAT M D

Limburg, H. The Histological Diagnosis and the Prognosis of Newgrowths of the Breast (Zur histologischen Diagnose und Prognose von Neubildungen in der Mamma) *Ztschr f Geburtsh u Gynak.* 1936, 114 7

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eighth cervical and first thoracic root form obtuse angles opening upward. When the shoulder is forcibly lowered the fifth and sixth cervical roots become tense and stretched the seventh cervical is stretched slightly less and the eighth cervical and first thoracic root remain flaccid. This explains the frequency of superior or total syndromes and the rarity of middle and especially lower syndromes.

In order to reduce his resistance to the wind as much as possible the motorcyclist holds his trunk flexed forward and his shoulders slightly abducted and backward. The obstacle with which he comes into contact in an accident usually strikes him on the anterosuperior part of the shoulder. This region is violently lowered and pushed backward while the cervical vertebrae are bent and fixed to the opposite side. The brachial plexus and the soft parts surrounding it are violently stretched downward. Because of the anatomical relationships described trauma of medium severity causes stretching and injury of the fifth and sixth cervical roots. In more serious injuries which are usually accompanied by fractures the seventh and eighth cervical and the first thoracic root are also injured and complete or total brachial plexus paralysis results. Complete paralyzes of the brachial plexus are frequently ac-

companied by oculosympathetic syndromes due to involvement of the first thoracic root, and also by lacerations of the coverings of the axillary artery with resulting thrombotic occlusion or aneurysm formation. When the traumatizing agent strikes the elbow, arm, or forearm instead of the shoulder the resulting nerve lesions are peripheral and due to involvement of the secondary trunks of the plexus. The author describes these various types of brachial plexus paralysis.

Of the 10 patients whose cases are reported 5 were operated upon. Of 7 who were re-examined from one to eight years after the trauma only 3 showed some improvement. Only 1 of the latter had been operated upon. This was a patient with incomplete paralysis of the secondary trunks. Even in cases of such paralysis improvement was always incomplete, being limited to a few muscles. In superior and middle syndromes due to involvement of the secondary trunks some improvement can be expected. Complete paralysis of the brachial plexus has a very poor prognosis. The author agrees with others that when surgical intervention is indicated it should be done soon after the injury, before scarring of the traumatized mass has occurred.

DAVID ISHIZATO, M.D.

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mitted for the opinion of others irradiation should be given

The time that has elapsed is insufficient to allow conclusions as to the increase if any in the incidence of cure by the addition of pre-operative irradiation but sufficient evidence has accumulated to demonstrate that there is apparently no danger in delaying the complete operation for pre-operative irradiation

JOHN H. GARLOCK, M.D.

St. Michalek Grodzki Plastic Operations on the Nipples (Opérations plastiques des mamelons) *Bull et mém Soc d chirurgiens de Par* 1936 28 387

Deformities of the nipples may render their function difficult or impossible. Therefore surgical correction of such deformities is sometimes desirable. The condition may be the result of maldevelopment, trauma or inflammation.

From the standpoint of surgical pathology, the most important structure about the nipple is the thin plaque of smooth muscle that occupies the areola. In the center there is an opening through which the nipple passes. Here the muscle forms a well defined ring which is attached to the fibers within the nipple. In cases of flat nipples the opening is large and the muscular plaque is atrophied, whereas in cases of fissured or inverted nipples the opening is narrow and the muscular plaque is hypertrophied. The essential step in various plastic operations on the nipple consists in enlarging or tightening the sphincter to maintain the nipple in its new position.

The details of the operations described by the author which are complex are shown by 48 diagrams. Because of the remarkable capacity of the breast for regeneration and hypertrophy, it is possible to obtain good results even in atelia.

ALBERT F. DE GROOT, M.D.

### TRACHEA LUNGS AND PLEURA

Sergeant E. Durand H. and Kourilsky R. The Anatomicoclinical Forms and Diagnosis of Pulmonary Abscesses (Formes anatomocliniques et diagnostic des abcès pulmonaires) *Bull l'Ass d méd de la langue franç de l'Amérique du Nord* 1933, 3 30

There seems to be no doubt that suppurations and primary cancer of the lung are much more frequent than formerly and that the increase is real and not due merely to improved methods of diagnosis.

These suppurations are classified into diffuse and circumscribed. The diffuse forms may be acute or chronic. Among the acute forms are dissecting pneumonia, diffuse suppurated bronchopneumonia and multiple abscesses from pyosepticemia. The chronic forms are manifestations of purulent bronchorrhea and particularly of dilatation of the bronchi. Circumscribed suppurations include 2 distinct groups: secondary suppurations in pre-existing cavities and abscesses properly speaking. The secondary suppurations in pre-existing cavities in-

clude intrapulmonary congenital cysts, juxtapulmonary dermoid cysts, hydatid cysts, and hematocysts. Abscesses properly speaking generally result from acute inflammation. They may result from the necrosis of a cancer or a syphilitic gumma.

Abscesses may be divided into the simple and the complicated. Simple abscesses include amebic abscesses, abscesses from pyogenic cocci and abscesses which are putrid from the beginning. Complicated abscesses include simple abscesses which have passed into a chronic condition and abscesses associated with other affections such as bronchiectasis, pleural effusion, and tuberculosis.

The roentgen diagnosis of these different forms of abscess and their differentiation from each other is described and illustrated with roentgenograms.

Recovery results in 70 per cent of cases of pyogenic abscesses and 30 per cent of those of putrid abscesses. This fact renders the interpretation of different medical treatments doubtful. Some of them are only apparently successful as recovery would have occurred spontaneously. Before operation is considered the patient should be given a chance to recover spontaneously. No matter what organism is responsible for it the abscess generally resolves in from six weeks to two months if it is going to resolve spontaneously. Therefore if cure has not taken place spontaneously or under medical treatment at the end of two months, operation should be performed. Otherwise the abscess will become chronic and operation later will be more difficult and less likely to be successful.

The only reliable evidence of cure is total clinical and roentgen repair of the lung parenchyma, no matter whether the abscess is of the pyogenic or the putrid type. If this fact is borne in mind the physician will not be deceived by false cures. If the outline of a cavity disappears and is replaced by an opaque zone, operation should be performed if two months have elapsed since the beginning of the infection.

The radical difference between pyogenic abscesses and putrid abscesses is emphasized. The latter are much more serious on account of their tendency to indefinite recurrence. This is due to the persistence of bacteria—probably spirochetes—in the walls of the abscess. Therefore simple pneumotomy is not sufficient for cure; excision even of the walls of the abscess to a certain depth is necessary. The greater the delay the more extensive the removal necessary and the more dangerous it will be because the sclerosis keeps the bronchi and vessels fixed and gaping.

The choice of operative method—pneumotomy, pneumectomy or lobectomy—will depend upon the anatomical type, extent, site and complications of the abscess.

ANDREY GOSS MORGAN, M.D.

Berch, M. and Harris, W. The Use of Roentgen Therapy in Bronchiectasis. *J Am M Ass* 1933, 103 517

So far as the authors are aware the successful use of roentgen irradiation in large dosage as the sole

treatment of chronic secreting bronchiectasis has not been previously reported. In this article they record the favorable results obtained in 30 cases. The rationale of the method, which is largely empirical, is based mainly upon the known effects of roentgen rays on chronic inflammatory processes. Correct diagnosis of both the site and the extent of the involvement is a prime requisite in the treatment. The irradiation is indicated only in "wet" cases since its chief aim is to arrest the expectoration. It is considered suitable only for patients who are ambulatory and afebrile and present a chronic lesion with a more or less constant level of expectoration and without marked remissions.

Of the 30 cases treated, 14 belonged to a group secondary to chronic anaerobic lung abscess. Three were characterized by the expectoration of a moderate amount of odorless sputum, and 13 by the expectoration of large quantities of foul sputum. All of these cases are tabulated as to the duration of the symptoms, the expectoration in ounces, and the technique, duration, and results of the treatment.

Roentgen therapy in large dosage was given to these patients over a period of approximately three months. All of the diseased and secreting lobes (as revealed by thorough bronchography and bronchoscopy) were cross fired through anterior, lateral, and posterior fields. From 3 to 7 fields were irradiated. The average total dose was approximately 1,200 roentgens through each of the anterior, lateral, and posterior fields. The physical factors of the technique were from 180 to 200 kv, a focus skin distance of 50 cm, a current volume of 4 ma, filtration with 0.5 mm of copper and 1 mm of aluminum, and fields measuring 10 by 15 cm. Each treatment consisted of 75 roentgens, measured in air, to 2 or 3 fields. The treatments were usually given 2 or 3 times a week.

During the course of the treatment the symptoms were usually exacerbated at first. Noticeable improvement began after approximately three fourths of the series of irradiations had been completed. It was signaled by a gradual and progressive decrease in the cough and foul expectoration. The improvement continued for a period of at least four months after termination of the treatment. In a number of the cases clubbing of the digits has surprisingly subsided, and in some, posttherapy bronchography showed favorable alterations in the picture of the dilated bronchial tree.

The following conclusions are drawn:

1. In chronic secreting bronchiectasis roentgen therapy in moderately large dosage as the sole method of treatment is feasible and successful, resulting in great symptomatic improvement in a considerable percentage of cases.

2. In many cases of chronic bronchiectasis treated with moderately high dosage of roentgen therapy the improvement is so great as to approach practically complete cessation of the symptoms of expectoration and cough.

3. Follow up examination over a period of two

years in cases in which there has been improvement has shown no recurrence of symptoms with infections of the upper respiratory tract.

ADOLPH HARTUNG, M D

#### O'Brien, E J Results of 15 Consecutive One-Stage Lobectomies for Bronchiectasis *J Thoracic Surg*, 1937, 6 278

The author reports 15 cases of bronchiectasis in which a Brunn Shenstone one stage lobectomy was performed. The one death in the series was due to pulmonary embolism and occurred on the fourteenth day. To reinforce the interrupted ligatures in the end of the stump, the author places a mass ligature in the groove formed by the tourniquet. Rapid re expansion of the remaining lobe is insured by the application of constant low pressure suction to three drainage tubes.

RICHARD H OVERHOLT, M D

#### Arce, J Total Pneumonectomy for Congenital Bronchiectasis *J Thoracic Surg*, 1937, 6 344

In the case of a boy twelve years of age a right pneumonectomy was performed for polycystic disease of the lung. A Wertheim bent clamp was applied to the pedicle and a silk ligature used. Bleeding from the chest wall required packing of the cavity with large gauze compresses. Convalescence was uneventful although the wound was not completely healed after ninety days.

RICHARD H OVERHOLT, M D

#### Longacre, J J, Carter B N, and Quill, L McG An Experimental Study of Some of the Physiological Changes Following Total Pneumonectomy *J Thoracic Surg*, 1937, 6 237

Since it is only under conditions of increased tissue demand that the efficiency of the cardiorespiratory unit can be tested, the authors decided to attempt to evaluate in accurate physiological terms the degree of cardiorespiratory impairment following total pneumonectomy and to assay the degree to which animals could in time achieve functional adaptation to the anatomical removal of approximately 50 per cent of their pulmonary tissue.

Previously trained dogs were used. Studies were made of the changes in the pulse, respiration, and temperature, the gas in both arterial and venous blood, and the oxygen debt during treadmill runs for varying lengths of time. Tracings were made of the respiratory dynamics and the subtidal lung volume, and the animals subjected to an anoxemia test under absolute strain. Pneumonectomy was then done, and two months later the tests were repeated.

Following pneumonectomy the animals showed increasing respiratory embarrassment as the amount of strain was increased. The cardiorespiratory reserve was still sufficient under resting conditions and for moderate exercise, but as the amount of strain was increased the impairment of the cardiorespiratory reserve became more apparent.



Before pneumonectomy the aoxvemia test showed a clear cut end point between 5 and 6 per cent of oxygen whereas following pneumonectomy the value was 11.3 per cent. After four months there was a slight readjustment the oxygen tension required being therefore slightly less. The nature of the compensatory mechanism is still unknown. Whether this mechanism is based on a hypertrophy or a true pulmonary hyperplasia remains to be determined.

RICHARD H. OVERHOLT, M.D.

### MISCELLANEOUS

Brown, A. L. Traumatic Rupture of the Thoracic Duct with Bilateral Chylothorax and Chylous Ascites. New Operation. Report of a Case. *Arch. Surg.* 1937, 34, 120.

The case on which the following study is based appears to be the first instance of traumatic bilateral chylothorax with associated chylous ascites reported in the literature. However, up to June 1935, 46 cases of chylothorax of traumatic origin have been reported (Lühse and Fox).

The woman in the author's case was injured in an automobile collision on May 14, 1933. She sustained a fractured humerus which was treated surgically. Two months later she developed fever and malaise. The following week fluid was found in the abdomen. A laparotomy was performed and a large amount of chyle-like liquid was evacuated. Seventeen days after the operation she became dyspneic and fluid was found in the thorax bilaterally. Aspiration of the thorax was performed and chyle was obtained. Repeated thoracentesis and paracentesis were necessary until a second operation was performed. A review of a roentgenogram taken ten weeks after the accident showed a rounded shadow of increased density at the right cardio-diaphragmatic angle. This was now interpreted as a chylous cyst since pneumopentoneum demonstrated no sign of diaphragmatic hernia at this site.

It was decided to provide external drainage with the hope that the rupture of the thoracic duct might be given an opportunity to heal. Under local anesthesia a vertical right lumbar incision was made down through the paravertebral muscles exposing the crus of the diaphragm. By following along the body of the first lumbar vertebra a soft mass which communicated with the right pleural cavity was encountered. A fecustrated rubber drain was inserted into the posterior mediastinum up to the

pleural opening. The layers of the wound were approximated about the drain. The following day while straining at stool she suddenly died.

Autopsy revealed the immediate cause of death to have been adrenal apoplexy. The thoracic duct when dissected out showed an interruption in continuity 2.5 cm. above the diaphragm; the distal lumen was occluded; the proximal lumen was just patent. The intestine showed dilatation of the lacteals. There was massive hemorrhage in both the cortical and medullary zones of the adrenals. The post mortem diagnosis was rupture of the thoracic duct with chylothorax, chyloperitoneum, emaciation, inanition, fatty infiltration of the liver, fibrinopurulent pleuritis, and fatal bilateral adrenal apoplexy.

A study of the literature reveals that in other cases of chylothorax of traumatic origin a cystic mass has been observed in the region of the ruptured thoracic duct. Further similarity to the author's case was seen in that the sudden force had caused a sudden hyperextension of the spine. Anatomical studies show that the medial crus of the diaphragm may be drawn so tightly against the vertebra as to cause rupture of the taut duct between them.

After rupture of the duct there was a localized extravasation of chyle which persisted for some days or weeks before the tissues of the mediastinum and pleura became sufficiently macerated and the fluid finally penetrated into the pleural cavity.

Early in the process the cystic extravasation of chyle could be detected in a roentgenogram.

Early discovery and drainage of this cystic mass may obviate the later complications of chylothorax and chylous ascites and allow the rupture of the duct to heal spontaneously.

Autopsy in the author's case showed that chyle may be extravasated either because of a direct rupture of a chyle duct (causing the escape of chyle into the thoracic cavities) or because of back pressure. In this case the duct was obstructed below the level of the diaphragm and the abdomen was filled with chyle so that the patient exhibited both methods of extravasation of chyle.

An operative procedure and approach for drainage of the usual site of traumatic rupture of the thoracic duct are presented and illustrated.

This unusual case of combined bilateral chylothorax and chylous ascites is described in detail and adequately illustrated.

JOHN E. KIRKPATRICK, M.D.

# SURGERY OF THE ABDOMEN

## ABDOMINAL WALL AND PERITONEUM

Crohn, N. N. The Injection Treatment of Hernia  
*J Am Med Ass*, 1937, 108, 540

In the surgical literature there are reports of thousands of cases in which hernia was supposedly cured by injection treatment. It is to be feared, however, that the follow up of many of these cases has not been sufficiently long for final judgment. In the author's series of cases the follow up has not been completely successful and the percentage of treated patients returning to the clinic after completion of the series of injections has been disappointingly small and inadequate for statistical analysis.

Experimental work has demonstrated that the injection of irritating fluids produces scar tissue. Alcohol and tannic acid cause acute local inflammatory changes followed by the formation of fibrous connective tissue or scar tissue. Phenol in irritating solutions produces areas of necrosis. The formation of scar tissue should not be the desired end for it apparently does not cure the hernia. Recent research has shown that scar tissue is considerably weaker than normal tissue, and under stress and strain is a vulnerable point. It is the author's belief that the ultimate metaplasia of the fibrous tissue into collagenous connective tissue is the curative agent in hernia. Hernia with large anatomical defects such as those in direct hernias and in diastasis recti cannot be cured by sclerosing agents because of the size of the defect which is filled in by a weak layer of connective tissue.

The author points out that the operative treatment of indirect hernia consists primarily of removal of the sac with high ligation of its neck. In the reducible hernia, though the contents are replaced in the abdomen, the sac itself is never reduced. In most cases the condition is due to the temporary defect caused by the ingress into the sac of intestines pushing the walls of the inguinal canal apart. With the sac empty and the walls close to each other obliteration is accomplished by the injection of a sclerosing solution. The solution may be injected into the sac or, preferably, about its walls. This produces a local plastic peritonitis. The truss prevents entrance of abdominal contents into the sac and maintains compression of the sac wall. Aspiration of blood will warn against injection into a blood vessel. Injection into the vas deferens is always accompanied by severe pain. The resulting scar tissue does not cause obliteration of the lumen of the vas.

Cases considered unsuitable for injection are (1) hernias in patients with atrophic and atonic tissues, (2) hernias with undescended testicles, (3) irreducible hernias, (4) sliding hernias, (5) local inguinal adenopathy of various types, (6) hernias

associated with constitutional disease, and (7) hernias in patients with psychiatric maladjustment.

The author uses a solution consisting of 40 parts of phenol, 35 parts of 95 per cent alcohol, and 25 parts of oil of thuya. About  $\frac{1}{2}$  c cm of this solution is injected at a sitting. Crohn selects his cases and treats by injection only indirect hernias which are easily reduced and remain reduced by a truss, and small direct and recurrent hernias.

BENJAMIN G. P. SHAFIROFF, M.D.

Glenn, F., and McBride, A. F., Jr. The Surgical Treatment of 500 Hernias  
*Ann Surg*, 1936, 104, 1024

The authors state that hernias are the second most frequent lesion encountered on a general surgical service. In all of the cases reviewed the technique included the use of silk as suture material. While the results of repair depend upon a number of factors, the factor of most importance is the duration of the hernia. Therefore surgery should be performed as soon as possible after diagnosis is made.

The pre-operative treatment is not distinctive except in the cases of obese patients, in which a liquid diet, a tight abdominal binder, and free catharsis for decompression of the intestinal tract are ordered.

Local anesthesia is preferred by the authors because postoperative pulmonary complications are less frequent and nausea and retching are less severe when anesthesia of this type is employed. The theory that the injection of a local anesthetic favors infection is not borne out by the authors' experience.

After the repair of a hernia the authors' patients are kept in bed for fourteen days. When, in cases of indirect inguinal hernia, the structures are strong and the defect is small, a Halsted repair without transplantation of the cord is done. In this procedure the sac is dissected up to its neck, where it is ligated and transected with doubled silk. The cremaster muscle and fascia are drawn up under the conjoint tendon and internal oblique muscle. The internal oblique muscle and conjoint tendon are sutured to Poupart's ligament. The external oblique is then imbricated by overlapping it on itself. If the structures are weak or the defect is large, a Halsted operation with transplantation of the cord to subcutaneous tissue is performed.

The authors emphasize that care must be taken to avoid drawing the sutures too tightly and to prevent undue tension in the approximation of the tissues.

Indirect inguinal hernias are due for the most part to a congenital weakness. Direct hernias occur because of an acquired attenuation of the structure comprising the conjoint tendon. Therefore in cases of direct hernia it is more often necessary to transplant the cord.

In the 26 reviewed cases of recurrent inguinal hernia the usual technique was that of Hlabst with transplantation of the cord to the subcutaneous tissues. Gallie suggested the use of large fascial transplants to fill the defect when the structures cannot be approximated readily.

Of the 33 femoral hernias in the reviewed cases 19 were on the right side and 30 were in women. Twenty-seven of the patients were over forty years of age. The incidence of incarceration and strangulation was higher in hernias of this type than in those of any other type. The operation was carried out through an inguinal incision and the sac exposed below Poupart's ligament. The external oblique fascia and peritoneum were then divided and the hernia and its contents reduced. Closure was made by the classical procedure with the use of silk to approximate the pectineus fascia and Poupart's ligament.

Umbilical hernias usually occur in obese individuals. In most of the 34 reviewed cases they were repaired by the method advocated by Blake—longitudinal overlapping of the fasciae of the recti muscles with use of the anterior and posterior sheaths when possible.

Epigastric hernias occur above the level of the umbilicus. In all the 18 reviewed cases of hernia of this type the patients complained of abdominal pain and discomfort.

Of the 48 postoperative ventral hernias reviewed 12 followed cholecystectomy, 16 occurred in drained appendectomy wounds and 20 occurred in low midline incisions for pelvic operations.

There were no recurrences of either femoral or postoperative ventral hernias.

Acute hernias are those requiring immediate operation. In cases of hernia of this type it is the authors' policy first to relieve the intestinal obstruction. In femoral and inguinal hernias in which the bowel is gangrenous and resection is indicated an other abdominal incision is made and the bowel approached through it. Early operation for hernia may in time entirely eliminate mortality in such cases.

The postoperative complications in the reviewed cases were pulmonary complications in 3, phlebitis of the lower extremities in 7, superficial infection of the wound in 9, and hematoma of the cord in 6.

The authors state that from 63 to 75 per cent of recurrences are evident within the first six months after operation.

The types of hernia and the results in the reviewed cases are summarized in the following table:

Type of hernia	Cases	Patients re-examined	No.	Recurrences Per cent
Indirect inguinal	303	223	6	2.37
Direct inguinal	38	32	2	6.21
Recurrent inguinal	26	20	6	30.0
Femoral	33	26	3	11.5
Umbilical	34	28	0	0
Epigastric	18	14	2	14.2
Postoperative	48	41	0	0

FRANK E. STENCRITZED, M.D.

Masek J. Biliary Peritonitis with Spontaneous Rupture of the Bile Ducts Under Glisson's Capsule (Peritonitis biliaris mit spontanem Durchbruch der Gallenwege unter der Leberkapsel). *Arch. f. Klin. Chir.* 1936 p. 790.

The author first presents a general discussion of biliary peritonitis, its possible causes, especially in the absence of perforation, and reviews the extensive literature on the condition. He then describes in detail the large subserous bile ducts first described by Toldt, the dilatation of which, with simultaneous atrophy of the surrounding hepatic tissue, may result in rupture of these ducts with discharge of bile into the abdominal cavity, and reports in detail a case in which such rupture occurred.

The case was that of a man sixty-six years of age who was suffering from jaundice due to a cancer of the papilla of Vater. Later he developed a febrile condition with painful swelling of the gall bladder and the left lobe of the liver. Death followed peritoneal symptoms. A few days before death sudden collapse of the previously enlarged and easily palpated gall bladder and left lobe of the liver occurred with severe pain resembling that of stone colic. Autopsy disclosed a true biliary peritonitis due to the rupture of an aberrant bile duct on the surface of the left lobe of the liver which had undergone marked atrophy. This duct was quite dilated and had opened into the abdominal cavity in consequence of minute neeroses.

Histological studies disclosed fresh biliary atrophy of the liver of the cholestatic-cholelithic type with minute neeroses involving both the parenchyma and the bile ducts. It is possible that these inflammatory and degenerative processes may have been due to the spontaneous rupture of one of the bile ducts in the liver which occurred subsequently. In order to explain them the author calls attention to Toldt's description of aberrant bile ducts located in the left lobe of the liver in the region of the inferior vena cava and in the porta of the liver. As the result of disappearance of the hepatic tissue these ducts lose their physiological support and their specific function and are drawn nearer Glisson's capsule and as the consequence of considerable biliary stasis they swell and rise under the serosa. They then may rupture and evacuate bile into the abdominal cavity.

(HAIN) CLARENCE C. REED, M.D.

Butkiewicz T. Biliary Peritonitis without Perforation of the Bile Passages (Die gallige Bauchfellentzündung ohne Perforation der Gallenwege). *Arch. f. Klin. Chir.* 1936 185, 55.

On the basis of 9 personally observed cases and a complete review of the literature the clinical picture of biliary peritonitis without perforation of the bile passages is described and an attempt at explanation of the pathogenesis is of this condition is made on the basis of animal experimentation. According to Mondor (Diagnostics urgents abdomen 1930 Paris, Masson & Cie) an occurrence of this nature was first described by Dupre. The first detailed descrip-

tion of such an incident was given by Clairmont and Haberer. The author has collected from the literature 116 cases of diffuse peritoneal inflammation of this character with free exudate in the abdominal cavity, and 9 cases of circumscribed peritonitis of identical cause. Biliary peritonitis without perforation of the bile passages was observed at every age, but it was most frequent in from the fifth to seventh decades. Women predominated among the patients in the proportion of 75:45. Gall stones were present in 60 per cent of the cases. The ductus choledochus and the papilla were totally occluded in only 10 cases. In 3 patients the dilatation of the ductus choledochus was produced by a new growth in the head of the pancreas or the papilla. In 89 cases the patient stated that he had suffered pains in the abdomen previously for a period of months or years, but there was a history of typical gall stone colic in only 13.

The clinical descriptions in the literature show indisputably that the bile may pass through the wall of the gall bladder into the abdominal cavity in the absence of a perforation, and bile has been found in the gall bladder wall itself in some cases. Unusual pressure is not necessary in these cases. Experiments on animals and cadavers lead to the same conclusions. In 1917 Blad was able to produce injury of the wall of the gall bladder with a resulting leakage of bile by introducing pancreatic secretion (trypsin) into the gall bladder. In order that the pancreatic secretions may enter the bile passages directly, it is necessary that the papilla of Vater be occluded and that a communication between the excretory ducts exist above the papilla. This is possible only when the orifices of the two ducts are both in the ampulla of Vater. According to Chodkowski there was a common orifice of the ductus choledochus and the duct of Wirsung in the region of the ampulla of Vater in 80.43 per cent of 322 bodies in which autopsy was performed. In 8 of the 35 cadavers which Schmieden and Sebening studied, they succeeded in causing iodine to pass from the bile passages into the pancreatic duct, and vice versa, by pressing the papilla shut. If such a passage should occur clinically, by mechanical obstruction from a stone or a tumor and without the occlusion of the papilla of Vater, the occurrence must be attributed to spasm of the sphincter of Oddi. In accordance with Westphal, in this event it is customary to assume that the sympathicus is in a condition of irritation in which the terminal portion of the sphincter, the so called pylorus, is closed, while the ampulla itself is dilated. The best conditions for the passage of bile are brought about by hypotonic stasis of the gall bladder. On the other hand, irritation of the vagus nerve may result in a communication between the two excretory passages when the upper sphincter is narrow and the ampulla of Vater is wide. In the absence of gall stones, such a spasm of the sphincter may be produced by inflammation of the gall bladder or bile passages, or even reflexly from other organs. Clinical studies showed

that in a high percentage of cases trypsin was present in the gall bladder without producing any acute symptoms in the biliary system. In addition to the trypsin there was an increase of diastase in the bile, from a normal of from 10 to 20 units up to 200 or several thousand. This phenomenon, likewise, may be explained by the overflow of the diastase ferments from the pancreas. However, merely the presence of trypsin in the bile passages is not sufficient to induce necrosis of the gall bladder and biliary peritonitis, apparently the activating effect of bacteria, of cellular degeneration, and of leucocytes is also required. Biliary peritonitis and acute pancreatic necrosis have the same pathogenetic basis, in one the pancreatic secretions invade the bile passages, in the other the bile enters the duct of Wirsung, and both of these occurrences may take place at the same time.

The author investigated the development of non-perforative biliary peritonitis by animal experimentation. He introduced sterile pancreatic secretion and a solution of pancreon into the bile passages of 7 rabbits and 4 dogs, and pancreatic ferments together with a culture of bacterium coli in 19 rabbits and 10 dogs. These experiments substantiated the fact that the wall of the gall bladder becomes permeable under the action of the pancreatic ferments, so that by means of filtration a biliary peritonitis develops. However, the pancreatic ferments have this effect only if retained bile or infection is present simultaneously. In concluding the article the author reviews the pathological anatomy, symptomatology, diagnosis, and treatment of this disease.

Frequently preceding the onset of the disease there are attacks of pain in the epigastrium or definite gall stone attacks. The symptoms of biliary peritonitis usually set in suddenly with pains in the right hypochondrium, in the region of the liver and the stomach. They reach their acme in one or two days and then radiate further, sometimes throughout the entire abdomen. The pain is increased with pressure, sometimes sensitivity to pressure is greatest in the right lower quadrant and is mistaken for acute perforative appendicitis. The most frequent symptom is vomiting. The temperature is usually elevated to 38 or even 39 degrees, but when the condition is advanced it sinks again. As a rule the pulse is accelerated. The abdomen is generally distended and the abdominal walls are tense. Retention of feces and gas is frequent. The presence of free exudate in the abdominal cavity was determined before operation in only a small number of the cases. However, in comparison with the more usual forms of peritonitis, the exudate develops rather rapidly, in fact, as soon as resorption is hindered by the irritation to the peritoneum. If jaundice was present at the beginning of the condition it disappears with the development of the exudate. The symptoms develop rather more slowly than those of ordinary peritonitis so that as a rule operation is first performed on the second, third,

or fourth day. In cases with non-diffuse, encapsulated exudate the general symptoms are less pronounced while the local symptoms are more sharply limited.

The differential diagnosis of biliary peritonitis without perforation of the bile passages is frequently missed. In the majority of cases a diagnosis of acute peritonitis resulting from appendicitis is made. In others a perforated gastric or duodenal ulcer is assumed. In some cases it is difficult to exclude acute pancreatic disease. It is most difficult to differentiate the condition from gall stone colic with localized peritonitis or peritonitis due to perforation of the gall bladder or the bile passages. In making a diagnosis of his 9 cases the author was correct in 3 instances and hesitated between non-perforative biliary peritonitis and acute pancreatic disease in 3 others.

In the presence of encapsulated exudate the abdominal cavity should be opened and drainage instituted. In cases of diffuse biliary peritonitis a perforation should be looked for as soon as the abdominal cavity has been opened. In severe cases if a perforation cannot be found cholecystostomy with drainage of the area about the gall bladder should be done. When the general condition is good the gall bladder should be removed. This must be done when gall stones or adhesions are present or when the wall of the gall bladder is definitely injured. If the papilla is occluded a choledochotomy must suffice at first and only after the general condition of the patient has improved is it permissible to reestablish the lumen of the papilla. On account of the frequent presence of bacteria in the exudate drainage of the abdominal cavity is indicated following every operation.

Of the 113 cases collected by the author in which the method of operation was given the mortality was 32 per cent. This figure is not much lower than that for cases of biliary peritonitis associated with perforation.

The detailed results obtained from operation are as follows:

	Total	No Recoveries	Deaths	Mortality %
Cholecystectomy	65	48	17	26.1
Cholecystectomy plus choledochotomy	8	4	4	50
Cholecystostomy plus choledochotomy in 1 case	20	14	6	30
Choledochotomy	1	1	0	0
Drainage of the abdominal cavity	16	8	8	46.6
Laparotomy	2	1	1	0
Choledochoduodenostomy	1	0	1	0
Choledochogastroenterostomy	1	0	1	0
			(suicide)	

So far not a single case of recurrence of non perforative biliary peritonitis has been reported.

(ARTHUR HINTZE) JOHN W. BRENNAN, M.D.

## GASTRO-INTESTINAL TRACT

Niederle Gastric Volvulus (Magenvolvulus) *Cas*  
111 *Zsch* 1936 p 1113

For convenience, volvulus of the stomach is divided by von Haberer into 2 forms: (1) the mesentero-axial form in which the organ turns about the axis of the lesser omentum because of unusual mobility of the pylorus and duodenum and (2) the form in which it turns about its own axis the greater curvature rotating toward the anterior abdominal wall to the level of or above the lesser curvature so that finally the lower pole of the stomach is formed by the lesser curvature and the upper pole by the greater curvature the anterior and posterior walls becoming reversed. In the latter type the point of rotation is the upper (cranial) third of the stomach. The cause is often a penetrating ulcer in that region which fixes that portion of the stomach.

The author reports a case of rotation in a man forty-eight years old who had an ulcer of the lesser curvature in the middle of the stomach. The rotation occurred about the crater of the ulcer in the long axis of the stomach. Detorsion occurred spontaneously. The patient refused operation.

The causes of gastric volvulus include ulcers, adhesions, excessive mobility, a tendency of certain portions or the entire stomach to rotate (elongate), relaxation and elongation of the so-called suspensory bands, gastropexia, and enteroptosis, aerocoly (marked meteorism of the colon especially the transverse colon), abnormal peristalsis, anatomical and topical changes in the neighboring organs and congenital malformations which latter the author considers particularly important. Clinically acute and chronic forms are to be distinguished. The former run the course of a high (gastric) ileus which according to Borchardt is characterized by (1) acute local gastric meteorism (2) the impossibility of introducing a stomach tube and (3) violentretch without vomiting. In addition there are the general signs of ileus. Payr adds (1) mislocation and elevation of the diaphragm (in diaphragmatic hernia there is dextrocardia) (2) difficulty in or inability to swallow and (3) the so-called thoracic fullness (Foüre).

A differential diagnosis must be made from high ileus of the small bowel, perforation, pancreatitis and gastric distention from arteriovenous vascular occlusion (which however is characterized also by intermittent biliary vomiting).

The chronic form usually develops slowly in the course of years with uncharacteristic symptoms as in the case reported. Roentgen examination which often gives quite typical pictures usually permits a positive diagnosis.

In many cases the stomach returns to its normal position spontaneously as in the case reported. Often it may be aided by the administration of a barium mixture. In other cases operative detorsion is required. The further course of the condition and

treatment are determined by secondary changes, adhesions and ulcer

(IRSIGLER) LEO M. ZIMMERMAN, M.D.

Ivy, A. C., Terry, I., Fauley, G. B., and Bradley, W. B. The Effect of the Administration of Aluminum Preparations on the Secretory Activity and Gastric Acidity of the Normal Stomach. *Am. J. Digest. Dis. & Nutrition*, 1937, 3: 879

The study recorded in this article was undertaken because aluminum preparations have been and are being used clinically to some extent in the treatment of peptic ulcer, and because the authors were unable to find any reports on the effect of the prolonged administration of relatively large quantities of such preparations on the secretory activity of the normal stomach.

When aluminum hydroxide cream and colloid aluminum hydroxide powder were administered to normal dogs for a period of four months in doses larger than those recommended for the treatment of peptic ulcer in man, there was no decrease in the gastric secretory response to a meal. The authors therefore conclude that the decrease in acidity reported to occur in patients with ulcer under treatment with aluminum must be due to factors other than an effect of the aluminum on the gastric secretory mechanism. Since the acidity of the gastric contents was slightly higher when non-medicated meals were given it appears that under the prolonged administration of aluminum the gastric secretory mechanism tends to compensate for the buffering action or to respond to other possible effects of the aluminum. The absence of this effect in human beings is believed to be due to the fact that the doses employed clinically are smaller.

When aluminum preparations were administered with a meal in a relatively large dose once or twice weekly, no definite change in the gastric secretory response to the meal was noted. Temporary "buffering" of acidity was, of course, obtained.

As judged from their appearance, the health of the dogs was not impaired by the relatively large doses of aluminum. The aluminum content of the liver of 7 or 8 dogs receiving the aluminum for a period of from three to eight months was within the normal range of variation. A review of the literature on toxicity of aluminum compounds is presented.

The effect of the administration of aluminum preparations both at hourly intervals and 6 times a day on the free acidity of the gastric contents of normal human subjects eating 3 meals a day are reported. The aluminum preparations buffered free acid and were more effective in this regard the more frequently they were administered.

WALTER H. NADLER, M.D.

Martin, J. D., Jr., and Elkin, D. C. Congenital Atresia of the Intestine. *Ann. Surg.*, 1937, 105: 197

Congenital anomalies of the gastrointestinal tract are of interest to both the embryologist and

the surgeon. Successful treatment depends upon early operation. The lesions may be classified into those manifesting themselves immediately after birth and those causing symptoms only in later life. The results obtained in cases of stenoses and atresias are uniformly poor. The first operative attempt was made by Bland Sutton. The first successful operation was an anastomosis between the separated segments. Atresias and stenoses are found in the gastrointestinal tract in 1 of every 4,000 children.

The author reports the 2 following cases:

Case 1. A newly born female child vomiting everything as soon as it was ingested. A series of gastrointestinal roentgenograms made eighteen hours after birth showed barium passing through the stomach and duodenum and into the small intestine. A large dilated loop of intestine occupied the left upper quadrant of the abdomen. A barium enema revealed small streaks along the colon. At operation forty-eight hours after birth a large dilated loop of small intestine was found extending from the duodeno-jejunal junction halfway to the cecum. At its distal tip it narrowed to about 1 cm. and 6 cm. farther on it ended in a blind pouch. There was a definite hiatus both in the gut and the mesentery. A tube was inserted into the proximal loop of intestine with no attempt at anastomosing the separate ends. Glucose and saline solution were administered both before and after the operation. Only a small amount of gas and no fluid drained from the enterostomy tube. The baby died fifteen hours after the operation.

Case 2. The patient was a female child three days old which had vomited everything since birth and was markedly dehydrated. Three stools were soft, mucoid, and greenish. The skin was dry and hot, and the abdomen tense and distended. Peristalsis was visible and active. A series of gastrointestinal roentgenograms showed the stomach and upper intestine distended with gas. The bowel terminated in a blind end in the lower abdomen. Operation was performed immediately after the subcutaneous administration of glucose and saline solution. The distended bowel in the lower right quadrant ended abruptly within a few inches of the cecum, and there was no communication between the two ends of the bowel. The large bowel was collapsed. An enterostomy was performed, but no attempt at anastomosis was made. A blood transfusion was immediately given. Convalescence was complicated by intussusception into the enterostomy. The intussusception was reduced 7 times. After the third week the dilated loop was allowed to remain on the abdominal wall. The enterostomy tube came out the twelfth day, leaving a fistula in the loop of intestine. Several days after the operation roentgen examination following a barium enema showed the barium flowing from the rectum to the cecum. One month later the entire extensorized intestine was freed, a segment several inches long resected, and the intestine then anastomosed laterally. The medical treatment of this case had a very important effect on the outcome.

or fourth day. In cases with non-encapsulated exudate the general symptoms are less pronounced while the local symptoms are more sharply limited.

The differential diagnosis of biliary peritonitis without perforation of the bile passages is frequently missed. In the majority of cases a diagnosis of acute peritonitis resulting from appendicitis is made. In others a perforated gastric or duodenal ulcer is assumed. In some cases it is difficult to exclude acute pancreatic disease. It is most difficult to differentiate the condition from gall tone colic with localized peritonitis or peritonitis due to perforation of the gall bladder or the bile passages. In making a diagnosis of his 9 cases the author was correct in 3 instances and hesitated between non-perforative biliary peritonitis and acute pancreatic disease in 3 others.

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	Total No.	Recoveries	Deaths	Mortality %
Cholecystectomy	63	43	17	27
Cholecystectomy plus cholecystomy	5	4	4	0
Cholecystomy plus choledochotomy in 1 case	70	14	6	30
Choledochotomy	1	1	0	0
Drainage of the abdominal cavity	1	8	8	46
Laparotomy	2	1	1	0
Choledochoduodenostomy	1	0	1	0
Choledochogastric enterostomy	1	0	1	0
			(Total)	

So far not a single case of recurrence of non-perforative biliary peritonitis has been reported.

(ARTHUR HINTZE) JOHN W. BRANNAN, M.D.

## GASTRO-INTESTINAL TRACT

Niederle. Gastric Volvulus (Münchener. Zeits. f. L., 1935 p. 111.)

For convenience volvulus of the stomach is divided by von Haberer into 2 forms: (1) the mesentero-antral form, in which the organ turns about the axis of the lesser omentum because of unusual mobility of the pylorus and duodenum, and (2) the form in which it turns about its own axis, the greater curvature rotating toward the anterior abdominal wall to the level of or above the lesser curvature so that finally the lower pole of the stomach is formed by the lesser curvature and the upper pole by the greater curvature, the anterior and posterior walls becoming reversed. In the latter type the point of rotation is the upper (cranial) third of the stomach. The cause is often a peristaltic arrest in that region which fixes that portion of the stomach.

The author reports a case of rotation in a man forty-eight years old who had an ulcer of the lesser curvature in the middle of the stomach. The rotation occurred about the axis of the ulcer in the long axis of the stomach. Deformation occurred spontaneously. The patient refused operation.

The causes of gastric volvulus include adhesions, excessive mobility, a tendency of certain portions of the entire stomach to rotate, fulgular relaxation and elongation of the so-called suspensory bands, gas roptosis and megacystosis, severely marked meteorism of the colon, especially the transverse colon, abnormal peristalsis, an omphal and topical changes in the neighboring organs and congenital malformation, which latter the author considers particularly important. Clinically acute and chronic forms are to be distinguished. The former runs the course of a high (gastric) torsion which, according to Borchardt, is characterized by: (1) acute local gastric meteorism, (2) the impossibility of introducing a stomach tube and (3) vomiting without vomiting. In addition there are the general: gas of ileus, Pavy adds (1) meteorism and elevation of the diaphragm (in diaphragmatic hernia there is dextrocardia), (2) difficulty in or inability to swallow and (3) the so-called thoracic pain (Fouquet).

A differential diagnosis must be made from high ileus of the small bowel, perforation, pancreatitis and gastric distention from arteriovenous or vascular occlusion (which, however, is characterized also by intermittent biliary vomiting).

The chronic form usually develops slowly in the course of years, with uncharacteristic symptoms as in the case reported. Roentgen examination, which often gives quite typical pictures, usually permits a positive diagnosis.

In many cases the stomach returns to its normal position spontaneously, as in the case reported. Often it may be aided by the administration of a barium mixture. In other cases, operative detorsion is required. The further course of the condition and

occur in the jejunum. On the basis of 3,284 cases collected from the literature it was calculated that the ratio of the jejunal type to enteric types of intussusception was 1:17. In other words, the incidence of the enteric type was 14 per cent whereas that of the jejunal type was only 0.9 per cent.

The authors report a case of jejunal intussusception in a boy nine years of age. The patient complained of intermittent colicky abdominal pains of two days' duration associated with vomiting. The symptoms began acutely. Examination disclosed some distention and tenderness in the lower part of the abdomen. No mass was palpable, but on rectal examination there was blood on the examining finger. The temperature was 100 degrees F. and the pulse 100. The urine was negative. The white blood cell count was 19,050. The provisional diagnosis was intussusception. At operation under anesthesia, a tumor could be palpated in the lower part of the abdomen. Through a right rectus incision, the mass was found to consist of 1½ ft. of gangrenous small intestine which was intussuscepted tightly with its mesentery. As the intussusception could not be reduced, the entire mass was resected and an end-to-end anastomosis was performed. The patient made an uneventful recovery and was discharged at the end of two weeks.

Gross examination revealed a double intussusception of the jejunum into itself and into the first part of the ileum with extensive gangrene of the jejunal part. The cause could not be found.

Jejunal intussusception usually occurs in adults and is frequently associated with a definite pathological lesion. The symptoms are of a chronic nature, but tend to become acute as constriction of the mesentery gives rise to the clinical picture of obstruction. On rectal examination a palpable abdominal mass and blood may or may not be found. Jejunal intussusception is rare as compared with ileocecal and sigmoidal intussusception. There are certain clinical features which may make possible an early diagnosis of this condition so that early operation may be undertaken before gangrene of the intestine develops. JOHN W. NUTZ, M.D.

Knapper, C. Terminal Ileitis (Ileitis terminalis). *Nederl. Tijdschr. v. Geneesk.*, 1936, p. 478z.

The author reviews the literature on terminal ileitis and reports 2 cases which he treated surgically. He states that although the condition has been recognized for a long time, it was first named in 1932 by Crohn. It is a non-specific inflammation which nearly always occurs in the last loop of the ileum. The cecum is seldom involved. The condition consists of an ulcerous inflammation of the intestinal mucous membrane and a thickening and cicatricial shrinkage of the intestinal wall. It has a pronounced tendency to form internal and external fistulas. Anatomical evidence of specific changes, especially tuberculous changes, and serological evidence of lues are absent. The disease is a chronic condition with exacerbations. In the acute stage a

diagnosis of appendicitis is usually made and the appendix is removed. Sometimes the condition is not correctly interpreted. An abscess then develops and leaves a fistula or the disturbances of incomplete intestinal occlusion continue. Blood and mucus are found in the stools. Sometimes diarrhea and emaciation occur.

Immediate radical resection as far as the transverse colon is advisable if there are no insurmountable difficulties. When the general condition is poor or abscesses are present only ileotransversostomy should be done at first and resection should be delayed. In the chronic stage resection is indicated. Even in the acute early cases the attempt should be made to palpate a sausage like tumor.

After the acute stage, roentgen examination following the administration of an opaque medium by mouth or by enema shows the cecum to have a tubular shape and discloses irregular filling of the last loop of ileum and dilatation of the lower part of the small intestine. Occasionally it discloses "threads" or filiform plexuses which correspond to fistulas.

(VAN GELDEREN) CLARENCE C. REED, M.D.

Odén, O. Ulcerative Colitis (Colitis ulcerosa). *Svensk Läkartidn.*, 1936, pp. 237, 293.

The various names given to inflammations of the colon: colitis gravis and ulcerosa, and suppurative colitis, always mention only one predominant characteristic of the disease. Gradually, a typical, independent clinical picture is formed which stands out from the ordinary mucosal or mucomembranous inflammations of the colon and is characterized by a more marked inflammatory reaction of the mucous membrane and the occurrence of ulcers. The ulceration varies from a few small ulcers to extensive, closely packed ulcers, more or less deep, which involve almost the entire mucous surface. Severe diarrhea with mucus and blood alternates with periods of obstinate constipation.

This form of colon inflammation was first described as a rare condition by the Englishman, Wilms, in 1875. After the World War a series of from 500 to 600 cases was reported in America. Boas introduced the name "ulcerative colitis" in 1902. The English and French (Mathieu, Lockhardt, Mummery) proposed the term "colitis hemorrhagica" for the more hemorrhagic forms. The names in the literature of the investigators of this condition are numerous, and the causes which have been attributed to the condition are equally numerous. Ulcerative colitis is believed to be the sequel to dysentery (Pels Leusden, Ehrmann), focal infection in the tonsil or periaapical abscesses (American reporters), prolonged constipation and resultant damage to the mucosa, functional disturbances, avitaminosis, anaphylactic states, hemorrhagic diatheses, and many more conditions. In any event, all other causes (lues, tuberculosis, amebiasis, sinusitis) must be excluded before the term ulcerative colitis may be applied.



In general the age of the patients ranges between twenty and forty years, and women are affected more often than men. Minute description of the pathologico-anatomical changes is unnecessary because they are so well known. The course and symptoms vary from the most acute onset and rapid death, or gradual subsidence and recovery to insidious onsets with gradual transformation to subacute or chronic states. The clinical findings vary accordingly. Blood sedimentation determinations may reveal values as high as 100 mm per hour. The blood picture shows a shift to the left in most cases. Stool examinations show no constant findings. The proctoscopic picture is most characteristic but carcinoma must be ruled out. Roentgen ray examination is of decisive value except in the mild cases. On the basis of Weber's roentgenological studies and results which the author recognizes as being very valuable it may be assumed that the roentgen diagnosis of colitis is well known. There are numerous complications: secondary anemia, peritonitis, pyemic pulmonary metastases, and others. The prognosis is correspondingly variable but usually very grave because of the tendency toward chronicity and recurrence.

Numerous treatments are advocated. They fall into two groups: surgical and non-surgical. The latter includes dietetic and hygienic measures, drug therapy, bowel irrigations, vaccine or serum treatment, blood transfusion and injection of metallic salt (manganese). Surgical treatment was recommended as early as 1885 by the French writer Folet who advised cecostomy. When operative treatment was limited to palliative measures such as appendicectomy, colostomy or ileosigmoidostomy it was not entirely satisfactory. Therefore surgical treatment became more radical (Lane, Nordmann, Rotter, Jordan, Kiefer, Dahl). The results were relatively good with cures in 50 per cent and improvement in 25 per cent of the cases (Leischner) but the mortality was about 15 per cent.

In this paper 4 cases are reported in detail with temperature curves and roentgenograms. In these cases medical treatment and cecostomy were without effect and colostomy was considered.

GERLACH, LEO V. ZIMMERMAN, M.D.

Einaudi, M. A Contribution on Cancer of the Colon. (Contributo allo studio del cancro del colon). *Clin. chir.* 1936 12 751.

The author's study is based upon 43 cases of cancer of the colon which were operated on during the last five years in the Hospital Umberto I in Torino. The patients numbered 24 men and 19 women and the majority of them were above the age of forty years. Only 5 were younger. The right colon was affected about the same number of times as the left. Eighty per cent of the tumors belonged to the adenocarcinoma type. In the non-ulcerated parts of the growth eosinophile cells were found in abundance although the leucocytic blood content was normal. In the cecum the cauliflower-like

papillomatous forms of cancer prevailed in the sigmoid, the annular stenosing forms.

The clinical course was characterized by a period of latency which sometimes extended until the stage of non-operability. The first symptoms were always caused by stenosis. In addition diarrhea sometimes alternated with constipation, and some times occult blood appeared in the feces but seldom in quantities which could be seen macroscopically. Pain or gastric disturbances occurred rather late. A reaction of the plexus solaris was frequently noted in association with tumors of the transverse and right colon. It occurred in the form of pain in the left costal or subcostal region and a feeling of fullness and oppression—a picture very much like that of neuropathic individuals without any organic lesion. Tumors of the transverse or right colon influenced the chemistry of the stomach: free hydrochloric acid was lacking and the total acidity was low in 8 cases. Sometimes there were no complaints although the mass of the tumor could be felt on palpation. This finding always indicated a very advanced stage of the tumor. It is for this reason that the least objective and subjective symptoms such as loss of weight, anemia, a subicteric complexion, slight temperature in the evening should be seriously considered before the mass of the tumor becomes palpable. Abscesses may occur early or late. Acute obstruction was more frequent in the left colon. Local perforations were rare.

For diagnosis rectal exploration under light anesthesia was very useful, especially in tumors of the sigmoid. The proctosigmoidoscope was used to advantage as well as insufflation of the colon. In radioscopy rectal dysma was used or rectal dysma combined with the administration of the contrast material by mouth. However, the ingestion of the barium meal may cause acute obstruction and necessitate immediate operation. Fluoroscopy in the supine position occasionally reveals tumors that have been missed in the roentgenograms. The author prefers a colloidal solution of thorium bismuthate to barium. Repetition of the examination is advisable. An exploratory laparotomy should never be delayed because x-ray examination is negative. The operability of the tumor can be judged much better by surgical exploration.

There is a difference in the treatment of tumors of the right and left colon. For the right colon ileocolic resection of the cecum or ascending colon followed by ileotransversostomy (anastomosis of the ileum and transverse colon) in one stage is relatively easy. In advanced cases the ileotransversostomy is done first and followed by resection of the diseased colon from eight to ten days later. The functional results are very satisfactory. However, the left colon presents more difficulties and dangers because of the virulence of the fecal contents and the less satisfactory function of a colon-to-colon anastomosis. Often in cases of this kind the formation of an artificial anus in the cecum followed by left hemicolectomy in one or more stages is advisable.

Palliative operations are the last choice, the average time of survival after them was from six to eight months. The general mortality after radical operations was 32 per cent. Death was due to pulmonary complications or embolism, never to some mishap with the sutures. In difficult cases, the operation in 2 stages gave better results than the operation in 1 stage. The good results in the surviving patients after a radical operation show the possibility of a permanent cure, as cancer of the colon forms metastases only rarely and slowly.

HELENE LUBOWSKI, M D

David, V C. The Treatment of Congenital Openings of the Rectum into the Vagina—Atresia ani vaginalis. *Surgery*, 1937, 1: 163

Congenital malformations of the rectum and anus differ widely, but in principle fall into rather definite groups. Trelat classified them into (1) strictures, (2) imperforate rectum, (3) absence of the rectum, and (4) abnormal fistulous communications. Atresia ani vaginalis falls into Trelat's anatomical group of abnormal fistulous communications, including cutaneous openings into the perineum from the rectum, scrotum, sacrum, and umbilicus together with the visceral openings of the rectum into the bladder, uterus, and urethra. These abnormal communications are predicated on an embryological failure of closure of the cloaca by the urogenital sinus which normally divides the cloaca into 2 parts, the anterior consisting of the bladder, urethra, and vagina, and the posterior of the rectum. This results in various abnormal openings of the rectum into the vagina, urethra, and more rarely the bladder. Pennington collected 473 cases of malformations of the rectum and anus from the literature. Of these, 167 were due to persistence of the original opening of the rectum into the cloaca. In 67, the rectum opened into the vagina or the vulva.

David reports his observations on the study and care of 6 children with the rectal opening inside of the vulva just posterior to the hymen, which was perfectly formed in all cases. In 2 of the children the vaginal opening of the bowel was small and insufficient so that bowel obstruction developed. Four of the children had an ample opening of the bowel into the vagina so that normal bowel movements were possible without evidence of obstruction. Operation on these patients was delayed until they were six years of age. During the interval, 4 of the children developed normal control of the action of the bowel in its abnormal position. In 2 of the patients there has been a definite separation of the rectal opening from the vagina. In 1 child the rectal opening is now perineal and both sufficient and continent. Operation on these 4 patients is not indicated as in none of them is there any evidence of sphincter muscles at the usual anal site. This observation has an important bearing on the replacement of a continent vaginal rectum to its normal site as under such conditions the opening would be largely incontinent.

When there is a small vaginal opening which cannot be dilated and maintained at the proper size a simple longitudinal division and transverse suture plastic of the rectal opening may be performed as a temporary procedure. When a vaginal opening is incontinent, radical operative replacement of the rectal opening at its normal site should be attempted. The results will be more satisfactory if the sphincter muscles are present at the site of transplantation.

No single surgeon's experience has been large in this field of operative work. Several surgeons have employed a racquet incision surrounding the bowel opening which is continued backward in the midline to the coccyx. After separation of the bowel from the vagina, the rectum was sewed to the skin in the new position and the vaginal defect closed. The newly implanted bowel tends to retract and gradually to resume the old position. To offset this tendency Ombredanne advocated transverse incisions at the site of the opening of the bowel and its intended site of transplantation. Stone has reported 3 cases in which a successful result was obtained in this way. David has fashioned skin flaps and sutured the free ends to the mucosa of the bowel which is transplanted. When the anterior wall of the bowel retracts, it pulls the skin with it and thereby lines the anal orifice with skin. In 2 cases in which this method was used complete control of sphincter action was obtained.

JOHN W. NUZZA, M D

Dukes, C. Histological Grading of Rectal Cancer. *Proc. Roy. Soc. Med.*, Lond., 1937, 30: 371

From his experience in grading more than 600 cancers of the rectum according to the system of Broder, the author draws the following conclusions:

1 Grading is a natural and practical method of classifying tumors.

2 When tumors are graded by Broder's method, the after history will show that the survival rate differs distinctly according to the grade.

3 The difference in the prognosis is due chiefly to the fact that the more anaplastic tumors are likely to have spread farther than the better differentiated tumors at the time they are treated surgically.

JOSEPH K. NARAT, M D

#### LIVER, GALL BLADDER, PANCREAS, AND SPLEEN

Kalk, H. The Significance of Laparoscopy in Diseases of the Liver and Bile Passages (*Die Bedeutung der Bauchspiegelung (Laparoskopie) fuer die Leber und Gallenwegserkrankungen*). *Karlsbad aerztl. Vortr.*, 1936, 15: 498

The author discusses his method of laparoscopy (originated by Jacobaeus in 1913), gives the indications for its use, and reports his diagnostic and operative (puncture of the gall bladder and cutting of the strands of adhesion) results during the past twelve years. He stresses the advancements that have been made which make it possible to determine whether surgical treatment is suitable in a number

of diseases Up to this time these determinations had not been possible by other means He assumes that the technique and instrumentarium are already well known

Contra indications to laparoscopy are active inflammatory processes and powerful adhesions within the abdomen By means of laparoscopy almost the same observations may be made as when the anterior wall of the abdominal cavity of a cadaver is removed especially enlargements, reductions, locations and displacements of the individual organs, tumors, and their metastases may be seen The author cites numerous examples of how a tensely filled gall bladder exerts pressure or perforates and how it retracts, in cases in which functional disturbances of the liver have already been determined by other diagnostic means The various types of hepatic shrinkage as to form surface markings, and color, may be distinguished easily by laparoscopy and in polyserositis the adhesive pericarditis may be recognized Single tumors as for example, primary carcinoma in a cirrhotic liver may be recognized only by this method and the origin of tumors which can be detected externally by palpation may be studied and indications for their surgical management may be observed In jaundice the color of the liver varies from yellow (simple jaundice) to green (occlusive forms of jaundice) Gall stones can be located Paracentesis through the liver of the tensely filled gall bladder causes amelioration of the symptoms In inflammatory conditions of the gall bladder or when stones are present roentgen examination and sounding will usually be sufficient for diagnosis When the condition is correctly diagnosed the best results from treatment will be obtained

(EGGERT) JOHN W BRENNAN M D

Stewart G P Scarborough If and Davidson J N The Levulose Tolerance Test of Hepatic Insufficiency *Edinburgh M J* 1937 44 105

Accumulated evidence as to the site and mode of levulose metabolism suggests that, properly applied, the levulose tolerance test should be of value in the study of liver function Recent methods permit the determination of levulose in the presence of glucose The authors method, which is a slight modification of the method of Patterson is described in detail

Estimation of the blood levulose of normal persons at half hour intervals after the ingestion of 50 gm of pure levulose showed a maximum concentration of from 12 to 18 mgm per 100 c cm from half to one hour after the ingestion Meanwhile, the blood glucose fell In a number of persons with clinical evidence of liver damage the levulose reached a concentration of more than 20 mgm per 100 c cm, and in some of these the blood glucose was increased above the fasting level In uncomplicated diabetes the blood levulose remained within the normal limits

Direct estimation of the levulose in the blood is a more reliable test of liver function than estimation of the total sugar The results cited support the

theory that levulose is converted to glucose in the liver independently of insulin, that it is then metabolized under the influence of insulin, and that it stimulates insulin secretion

WALTER H NADLER M D

Trusler H M and Martin H E The Cause of Death in Liver Peritonitis *Surgery* 1937, 1 243

Dogs receiving intraperitoneal doses of from 30 to 100 gm of fresh ground liver of adult dogs usually died within twenty four hours showing all the signs and chemical blood changes of shock

When the dose was less than 30 gm for an average dog there was a definite relationship between the length of survival and the amount of liver introduced One dog receiving  $\frac{1}{2}$  gm per kilogram of body weight (total dose 5 gm) survived

In the cases of the dogs which died peritoneal smears and cultures taken shortly before death consistently revealed growth of the dog liver anaerobe

The parenchymal elements of the liver were found to be relatively non toxic When these elements were separated from the blood vessel, bile duct, and connective tissue portions of fresh dog liver 70 gm of the parenchymal tissue suspension caused neither death nor shock However 50 gm of the connective tissue suspension caused both shock and death

Cultures of the parenchymal suspensions consistently showed that the parenchymal fraction of liver harbored the dog liver anaerobe Nevertheless smears and cultures of the peritoneal exudate removed from dogs subjected to the intraperitoneal introduction of parenchymal suspensions showed that these animals rapidly sterilized the peritoneal cavity even in the presence of large amounts of contaminated liver substance

The dogs receiving the suspensions of liver connective tissue rapidly died of shock and bacterial peritonitis while the dogs receiving the suspensions of hepatic parenchyma survived and remained well

HOWARD A MCKNIGHT M D

Mackey W A Cholesterosis of the Gall Bladder A Review Supplemented by Personal Observations on 87 Cases *Brit J Surg* 1937 24 570

The term "cholesterosis" of the gall bladder designates a condition in which the mucous membrane is infiltrated with a mixture of cholesterol esters and neutral fat This lipid material is distributed in a patchy fashion forming bright yellow flecks of variable size, sometimes slender and scanty and sometimes distending each mucosal fold so that the gall bladder seems to be lined with a thick soft golden, waxy fabric The strands of this fabric run longitudinally and terminate a short distance from the neck of the gall bladder Gall stones are found in about a third of all the cases and are almost invariably of the type rich in cholesterol

Virchow in 1857 described a type of fatty infiltration of the gall bladder mucosa Aschoff, in 1906 observed the occurrence of cholesterol in the epithelium of the gall bladder In 1909 Moynihan

termed cholesterosis a condition requiring cholecystectomy MacCarty in 1910 named 1 type of this condition the "strawberry gall bladder" Laroche and Flaudin in 1912, noted the association of cholesterosis with cholelithiasis Lichtwitz, in 1914, suggested that lipid polypi shed into the lumen of the gall bladder provided nuclei for stone formation Polchard, in 1914, deduced that cholesterosis is due to the resorption of cholesterol from bile Boyd, in 1922 and 1923, showed that in cholesterosis the dried mucosa of the gall bladder may contain as much as 60 per cent (by weight) of lipid instead of 0.6 per cent as in normal controls Mentzer, in 1925, recorded some degree of cholesterosis of the gall bladder in 37 per cent of all the cases coming to autopsy at the Mayo Clinic Corkery, in 1922, suggested that cholesterosis may not be a specific lesion but merely a random element in the protean manifestations of chronic cholecystitis

The source of the lipid material in cholesterosis may be either the blood or the bile Experimentally, difficulties are encountered in estimating the concentration of cholesterol in bile It appears from a review of the literature on this subject that the normal mammalian gall bladder resorbs cholesterol from bile If, however, the gall bladder is inflamed or traumatized, effusion of the blood serum will greatly increase the amount of cholesterol in the gall bladder

In a study of a small number of patients it was found that the cholesterol concentration is greater than the bile pigment concentration While significant, this does not prove that the gall bladder secretes bile Extensive studies on the physiology of the normal gall bladder show that its main function is absorption and that this function is accelerated by the hyperemia and increased permeability of inflammation Under certain circumstances the contained bile may be totally absorbed A study of the gall bladder wall shows that the greater part of the lipid deposit is in the stroma If the lipid material were secreted into the gall bladder it is likely that the deposit would be in the free border of the epithelial cells However, this is not the case

The ease of production of cholesterosis of the gall bladder varies with the dietetic habits of the animal In herbivora, the administration of a large amount of cholesterol leads to massive deposits in the liver, spleen, adrenals, aorta, and heart, and it is relatively difficult to produce lipid infiltration of the mucosa of the gall bladder On the other hand, in carnivora, it appears to be comparatively easy to produce a condition similar to human cholesterosis

The author has studied histologically about 400 gall bladders which were removed by various surgeons Among these, 81 presenting cholesterosis were encountered, and in the majority the mucosal lipid deposit was sufficiently large to be seen with the unaided eye The figures probably exaggerate the incidence of gross cholesterosis, for many of the cases were discovered during a study limited to the less severe grades of cholecystitis, and cases of

cholelithiasis were excluded from this series unless accompanied by cholesterosis

The general histological findings showed that lipid infiltration occurred in the lining epithelium or in the connective tissue of the mucosa, but more frequently and more abundantly in the latter Lipid infiltration was found in all types of gall bladders in some with no evidence of inflammatory change, in many which were slightly thickened and showed abundant infiltration with lymphocytes, and in a few, especially those which contained stones which were so greatly thickened and fibrosed that the infiltration constituted a very minor feature of the histological picture In one extreme example of the last type the mucosa was crowded with densely aggregated lymphoid follicles and the lipid deposit was confined to a few isolated macrophages within these follicles The degree of cholesterosis was never proportional to the degree of inflammatory change, and was slight if the latter was severe The histological picture presented by cholesterosis is so pleomorphic that it is hard to believe that it is a pathological entity Moreover, since accompanying inflammatory changes vary so greatly in degree, and may indeed be completely absent, the etiological basis of cholesterosis is surely not inflammation

The cholesterol polypi which are so common in cholesterosis of the gall bladder may be formed to accommodate a superabundance of lipid, or they may represent secondary cholesterosis of pre-existing polypi Both suppositions are probably correct In support of the second, it may be mentioned that polypi without lipid are occasionally seen, but they appear to be peculiarly susceptible to cholesterosis, as the polypi contain lipid much more often when the remainder of the gall bladder shows none

Therefore, cholesterosis is not a manifestation of cholecystitis, or of cholesterol secretion by the gall bladder, but of active resorption of cholesterol from bile unusually rich in that substance by a relatively normal mucous membrane Cholesterosis and lithiasis are cognate manifestations of supersaturation of the bile with cholesterol, not cause and effect However, cholesterosis is not without significance, for it certainly indicates a metabolic state with an unduly high level of biliary cholesterol, and therefore likely to lead to gall stone formation The cause of the characteristic stones both solitary and "mulberry," is primarily metabolic, not infective, although inflammatory complications of mechanical origin are likely to supervene later In simple cholesterosis the bacterial flora of the gall bladder is not richer than that of gall bladders regarded as practically normal from the histological viewpoint

In the absence of stones and secondary cholecystitis, the gall bladder showing cholesterosis is frequently capable of achieving a normal concentration of bile and dye The rapid diminution in size after the fat meal indicates either brisk contraction of the gall bladder musculature, or as Halpert, Sweet, and Blond would have it, rapid resorption of the contents of the gall bladder for re-excretion of the

liver. In any case it indicates a gall bladder with a function not far from normal.

It has never been possible to associate a pathogenic syndrome with cholesterosis. The complaints attributed to it have always been those generically termed cholecystic. In some cases there has been a history of biliary colic, in others, of "gall bladder dyspepsia." Such symptoms however occur in all types of derangement of the biliary apparatus both functional and organic and probably some of them may occur also in disturbances of other parts of the alimentary tract.

The reports of clinical results following cholecystectomy have been conflicting but this is not surprising as cholesterosis is a histological feature that may be found in gall bladders otherwise normal or in association with lesions of all degrees of severity.

MANUEL E. LICHTENSTEIN, M.D.

#### Heid, C. G. Complications of Gall Bladder Surgery. *Ann. Surg.* 1937, 105, 1.

Complications of gall bladder surgery may be classified as (1) mechanical, (2) chemical, (3) metabolic and (4) infectious. The complications that occur within the first twenty-four hours after operation are obviously those that are associated with hemorrhage, gastric dilatation, embolism, pulmonary collapse and cardiac dilatation. The early complications are those that arise from mechanical or infectious causes such as intestinal obstruction, volvulus, pyloric occlusion, peritonitis (local or general), abscess, retroperitoneal phlegmon. From the purely chemical standpoint certain complications occur. Some are secondary to continuous and repeated vomiting such as alkalosis, hypochloremia and hypohydration. There are also the acidosis from intractable diarrhea and the complications of obscure or perverted liver activity—liver deaths.

Complications occurring after cholecystectomy or cholecystostomy are different from those that arise from surgery of the common duct. The author analyzed 557 personal cases, both ward and private, in which laparotomy was performed for diseases of the gall bladder or the external biliary duct system. He asked himself the following questions: How many of these patients survived surgery? And in those who died, what was the mechanism of death? Were the preoperative preparation, the surgical intervention and the postoperative therapy competent and adequate? Furthermore, could any reasonable deductions be made that would help prevent the complications and mortality in any future group of patients? All the patients were operated upon by the author himself. A better showing could undoubtedly have been made if the analysis had been confined to private patients alone. It seemed wiser to take the total number because the conclusions could then be applied to the gall bladder service of any general hospital.

Of the 557 patients, 417 were private and 140 were clinic cases. Of the 417 private patients, 20

died (a mortality of 4.8 per cent). Of the 140 clinic patients, 19 died (a mortality of 13.5 per cent). This noteworthy difference in the mortality rate between the two groups is due to the greater degree of pathological damage in the clinic patients from delay in seeking surgical intervention.

Cholecystectomy is one of the safest of all intra-abdominal operations for chronic gall bladder disease and in the hands of a reasonably well trained surgeon is relatively free from postoperative complications. Operations upon the bile ducts or gall bladder in the presence of acute inflammation are associated with greater technical difficulties and a very marked increase in the frequency of complications. In 500 uncomplicated cases the mortality was 3.3 per cent but in 34 cases in which cholecystostomy was done for acute cholecystitis there were 5 deaths, or a mortality of 14.7 per cent. Pancreatitis was observed in 21 cases in the series and death resulted in 5, a mortality of 23.8 per cent. There were 13 malignancies of the gall bladder or ducts. All of the 13 patients were jaundiced and all had gall stones. Gall stones were present in 59.2 per cent of all the cases in the series. The average age of the patient at operation was 40.4 years; the youngest was eight and the oldest 79. Fifty-nine of the patients had ulcer of the stomach or duodenum associated with the gall bladder disease.

Of the 39 deaths in the series of 557 cases there were 8 which could not be attributed to the usual causes. In 2 of the cases hyperpyrexia and coma followed surgical intervention very shortly and progressed until death. In 3 cases of obstructive jaundice coma developed and the patients died. In 3 others pronounced cardiorenal collapse developed and the patients died in from 24 to 36 hours.

The author believes, after due consideration of all the factors involved (the type of lesion, the biological background of the patient, the adequacy of surgical intervention, the complications, and the mortality) that surgical treatment of gall bladder disease is safe and highly satisfactory.

HARRY W. FINK, M.D.

#### Boyden, E. A. The Sphincter of Oddi in Man and Certain Representative Mammals. *Surgery* 1937, 1, 25.

The experimental work of the last twenty-five years indicates the existence of an intrinsic musculature surrounding the lower end of the common bile duct which under certain morbid conditions can produce biliary stasis. Thus in the presence of an intact gall bladder, dysfunction of the sphincter of Oddi may induce gall bladder distress or colic even in the absence of calculi or inflammation. Despite extensive studies, skepticism still exists in regard to this structure for two reasons. In the first place it is exceedingly difficult to distinguish its action from that of the duodenal muscle which surrounds it and second on account of its small size, its position and complex histological demonstration of its independence is equally difficult.

According to Francis Glisson (1654), the sphincter consists of ring like fibers which occur not only in the opening of the bile duct but also in the entire oblique tract through the intestinal wall. Oddi's name has been applied to the sphincter not because he was the first to examine it microscopically, but because he demonstrated it in a variety of animals, and was the first to measure its resistance, to show that removal of the gall bladder caused marked dilatation of the bile ducts, and to postulate that dysfunction of this occluding apparatus might explain certain morbid affections of the biliary tract. With the more complete information now at our disposal it is realized that the longitudinal fibers of the sphincter may be as important as the circular fibers at least in some species. Herefrom originates the concept that the sphincter of Oddi is an ejaculating as well as an occluding mechanism. Therefore, it is necessary to define it as the entire musculature of the terminal portion of the bile channel and the associated pancreatic duct of Wirsung, if the latter is present.

In comparative embryological studies of the opossum, guinea pig, dog and man, the author demonstrates that the intestinal part of the bile channel (and its associated duct of Wirsung if present) is ensheathed in a 2 layered musculature which can be legitimately designated as the sphincter of Oddi. The 4 species differ markedly in the degree to which different segments of the sheath are developed or suppressed and in the relationship they bear to the duodenal muscle through which the bile duct enters the intestinal wall.

The human sphincter has 3 marked anatomical characteristics: (1) its relative freedom from intestinal interference, due to the configuration of the window in the duodenal muscle through which it passes, (2) the retrogression of its ampullary segment, and (3) the development of a special constricting mechanism (the sphincter choledochus) just above the site where the bile duct joins the ampulla of Vater. Anatomically, this zone of intrinsic muscle seems to be entirely adequate to sustain the column of bile and thereby cause the gall bladder to fill during the interval between meals. If such be its normal function, it is not difficult to believe that hypertrophy or over stimulation of such a sphincter results in biliary stasis and the production of right hypochondrial distress. ARTHUR S. W. THOROFF, M.D.

Elman, R. *The Variations of Blood Amylase During Acute Transient Disease of the Pancreas*. *Ann Surg.*, 1937, 105, 379.

Blood amylase determinations were made in 8 cases of acute epigastric pain with nausea, vomiting, and latent jaundice in which a clinical diagnosis of biliary colic, perforated ulcer, intestinal obstruction, or coronary disease had been made. In every case the concentration of amylase as determined by the method of Somogyi was found to be high at the height of the attack and gradually declined following subsidence of the symptoms.

The author believes that acute pancreatic disease may be the cause of many attacks of pain in the upper part of the abdomen which are at present incorrectly diagnosed. In all of the reviewed cases in which operation was performed there was anatomical evidence of disease of the pancreas. Elman is therefore of the opinion that blood amylase determinations should be made in cases with manifestations of acute disease in the upper abdomen.

ROBERT ZOLLINGER, M.D.

Brocq, P., and Varangot, J. *Changes in the Blood Sugar in Acute Necrosis of the Pancreas. A Critical Study of Their Diagnostic and Prognostic Value* (Les modifications de la glycémie dans la nécrose aiguë du pancréas. Étude critique de leur valeur diagnostique et pronostique). *J de chir.* 1937, 49, 177.

Brocq and Varangot cite the statistics of several surgeons showing that in a large percentage of cases the diagnosis of acute necrosis of the pancreas is not made pre-operatively. The highest incidence of correct diagnosis—21 per cent in 1,310 cases—was recorded by Schmieden and Sebnung.

Since it has been shown that the pancreas plays an important role in the regulation of carbohydrate metabolism and the blood sugar, it is reasonable to suppose that such extensive and severe lesions as those of acute necrosis would affect the carbohydrate metabolism and would be indicated by changes in the blood sugar. While experiments on dogs have failed to show any constant changes in the blood sugar as the result of experimentally produced acute pancreatic necrosis, it must be borne in mind that in such experiments the animal was in good condition and the pancreas was normal before the production of the acute necrosis, whereas in clinical cases of acute pancreatic necrosis there is almost invariably a previous hepatic insufficiency, and pathological examination shows evidence of chronic pancreatitis preceding the acute lesion.

In acute pancreatic necrosis, an increase of sugar in the urine has been observed, but the findings are inconstant, and a study of the blood sugar is of much greater importance. In normal subjects the blood sugar rarely rises above 150 either after eating or after the ingestion of glucose in the glucose tolerance test. Of 76 cases of acute necrosis of the pancreas reported in literature, the authors found that no blood sugar test was recorded in 4. Of the remaining 72 cases, the blood sugar was below 150 in 15, between 150 and 200 in 25, and 200 or over in 34. In 9 of the cases in which it ranged between 150 and 200, the record stated that this was the fasting blood sugar. Therefore in these 9 cases, in addition to the 34 in which the blood sugar was above 200, there was a definite hyperglycemia. Of 21 cases in which a glucose tolerance test was made, all showed an abnormal rise of the blood sugar, and in all the hyperglycemia persisted for two hours or longer.

The determination of the fasting blood sugar has therefore a certain diagnostic value in acute necrosis

of the pancreas but the glucose tolerance test is a surer indicator of a definite disturbance of carbohydrate tolerance. However this test is not always possible before operation. Some patients cannot take anything by mouth and the test requires a three hour delay which though not of importance if the condition is acute pancreatic necrosis may be fatal if it is some other acute abdominal disease.

The authors believe that the disturbance of carbohydrate metabolism in acute necrosis of the pancreas is to be attributed not to destructive lesions of the islands of Langerhans but to destruction of insulin by the activated trypsin which is discharged into the circulation because of the autolysis of pancreatic tissue occurring in acute necrosis.

While hyperglycemia is the rule in acute necrosis of the pancreas there are reports of a few cases in which hypoglycemia was noted. In the acceptance of hyperglycemia as evidence of acute necrosis of the pancreas in the presence of acute abdominal symptoms the following facts may give rise to error. Hyperglycemia may be present in other acute abdominal conditions. An acute abdominal condition may develop in a diabetic in whom the diabetes has not previously been diagnosed and symptoms suggestive of an acute abdominal condition may develop in diabetic coma. While acute necrosis of the pancreas may complicate diabetic coma this is rare. The authors cite 9 such cases from the literature in which the presence of necrosis of the pancreas was definitely determined at operation or autopsy.

The authors consider other methods of determining the function of the pancreas. The method of determining the excretion of trypsin in the urine has been used in pancreatic necrosis produced experimentally in dogs but not in pancreatic necrosis in man. The method of determining the lipase content of the serum has been employed in clinical cases but in the authors' opinion the difficulties of the techniques proposed and the length of time required for the test together with the divergent results obtained make this test impracticable in acute pancreatic necrosis. The method of determining the amylase of the urine described by Wohlgemuth is a rapid method and has a certain diagnostic value, but in acute necrosis of the pancreas the results are not constant and in the authors' opinion the urinary amylase must be above 1,000 Wohlgemuth units to be of diagnostic value.

There are a number of surgeons who advocate either no operative procedure in acute necrosis of the pancreas or at least delay of operation until the process has become localized and the shock accompanying the acute onset has been relieved. If these recommendations are to be accepted it must be possible to differentiate acute necrosis of the pancreas with certainty from the conditions most closely resembling it which require immediate operation—perforated peptic ulcer, ileus and appendicitis. The authors believe that delay of operation is justified only if in the presence of clinical symptoms characteristic of acute necrosis of the pancreas the

fasting blood sugar is at least 200 and the urinary amylase more than 1,000 units (Wohlgemuth). Unless these 2 determinations agree the diagnosis of acute pancreatic necrosis is likely to be erroneous and delay of operation may endanger the patient's life.

Postoperatively the amylase test is of no aid in the prognosis, but repeated determinations of the fasting blood sugar are of value. A lowered fasting blood sugar is a favorable prognostic sign. A persistently high fasting blood sugar over 250 indicates a very unfavorable prognosis, usually a fatal termination. A rise in the fasting blood sugar indicates a recurrence of the necrotic process. This sign may precede the development of clinical symptoms.

It has been found that when patients recover from the acute stage of pancreatic necrosis a true diabetes may develop. Still more frequently if glucose tolerance tests are made at intervals after the acute attack an abnormal blood sugar curve—a pre-diabetic curve—may be demonstrated. The authors report 3 such cases and cite from the literature 2,6 similar cases in which glucose tolerance tests were made after recovery from acute pancreatic necrosis. In 88 (31 per cent) of the total number of 270 cases there was an abnormal blood sugar curve without symptoms of diabetes indicating a latent disturbance of carbohydrate metabolism. If such disturbances persist they are an indication for active treatment by diet and insulin. *ALICE M. MYERS.*

Widdegans H. Expectant or Primary Surgical Treatment of Acute Pancreatic Necrosis? (Abwartende oder primäre chirurgische Behandlung der akuten Pankreasnekrose?) *Chirurg* 1935 8 593

The author discusses the possibilities of diagnosis of acute pancreatic necrosis. Of the methods which reveal disturbances in the internal or external pancreatic secretions only those are of value in practical surgery which can be simply performed without great loss of time and give a reasonable promise of definite results. Blood sugar determination reveals a considerably elevated level in every case of acute pancreatic necrosis (certain early symptom). The degree of hyperglycemia depends upon the completeness of the pancreatic destruction. Of 52 severe cases 49 showed this type of underfunction of the gland. Very high sugar levels indicate serious, usually irreparable, necrosis. It is important to observe the blood sugar level continuously. It is equally important for the diagnosis, indication, prognosis and treatment. Urinary-diastase determinations should never be omitted. In early stages increased quantities of diastase are practically always found. If the acute condition subsides in a few days the diastase level also recedes. The determinations may fluctuate enormously on successive daily examinations. Traces of diastase in the urine are found in the severest pancreatic necroses when fermentations can no longer be produced because of total destruction of the gland. For determining the prog-

nosis and the severity of the disease, the diastase test is of no value when compared with blood sugar determinations. The average determination in acute necrosis is around 7,000. The determination of pancreatic lipase is difficult and time consuming. Only when expectant treatment is indicated is its determination of interest. Blood studies especially the white cell count, determination of the non-protein nitrogen, the indican test, urine analysis, and the determination of diuresis add to the evaluation of the clinical picture. Duodenal pancreatic diagnosis is considered of no value.

For the past three years the author has not operated primarily in a single case in which the diagnosis of acute pancreatic necrosis was made. Of the 32 patients, 4 were operated upon because of a questionable diagnosis of peritonitis or bowel obstruction. Laparotomy clarified the diagnosis. Only conservative exploration was done. In 28 patients, a correct diagnosis was made and surgery was purposely postponed. All patients with acute necrosis were treated like those who had undergone gastric resections. Narcotics and atropine were administered in large and repeated doses. The patient was forbidden to drink anything. Intravenous infusions of salt, glucose, and insulin, and proctoclyses were given. Blood transfusions were resorted to in the most severe cases for detoxification, and later hypophysis, sympatol, and cardiac remedies were administered to overcome the fall in the blood pressure. After the subsidence of the acute manifestations a sausage shaped resistance in the region of the entire pancreas was not infrequently found. It could be demonstrated for weeks and months. Secondary abdominal abscesses requiring incision developed twice (recovery after drainage). In the expectant treatment of acute pancreatic necrosis, the greatest danger is that of recurrence. The patients should be urged emphatically to have their gall bladders examined regularly. However, this procedure should be postponed for at least from four to eight weeks. Usually cholecystectomy with common duct drainage is performed. The author performed this secondary biliary operation 14 times, and considers it dangerous only if it is done too soon. The patients recovered in all 14 of the cases. Of the entire series

of 32 patients, 27 recovered and 5 died. These results justify further employment of the expectant treatment with secondary cholecystectomy and choledochus drainage for acute pancreatic necrosis. The more often acute necrosis is recognized with certainty, the less often early operation will be needed. The more often early operation gives way to secondary biliary revision in acute pancreatic necrosis, the better the results will be.

(L. DUSCHL) LEO M. ZIMMERMAN, M.D.

#### MISCELLANEOUS

Rabboni, F. The Right Abdominal Syndrome in Childhood and Adolescence (La sindrome addominale destra nell'infanzia e nell'adolescenza). *Clin. chir.*, 1936, 12, 878.

The author reports 40 cases of Leotta's right abdominal syndrome in patients under fifteen years of age who were observed at the Surgical Clinic of Palermo during the last five years. He calls attention to the fact that chronic appendicitis in such young persons has been little studied. He discusses the relationship between chronic appendicitis and the simple right abdominal syndrome.

The right abdominal syndrome is a chronic and periodical affection of the digestive tract due to a chronic inflammation of the appendix in children and adolescents. The symptoms are anorexia, nausea, eructation, constipation, and pain which is localized in the epigastrium and ileocecal fossa and diffused over the whole right half of the abdomen. In the first stage only the appendix is chronically inflamed. Later the peritoneum becomes involved.

Operation should be performed as early as possible if the condition is neglected in children and adolescents; it may develop later into the more severe and complicated forms of right abdominal syndrome in adults, such as cholecystitis and gastro-duodenal ulcer. Operation was done in 18 of the 40 cases reviewed by the author.

In conclusion Rabboni says that the right abdominal syndrome has been confused with dyspeptic disturbances, ordinary gastritis, and the most varied diseases of the gastro-intestinal tract.

AUDREY GOSS MORGAN, M.D.



# GYNECOLOGY

## UTERUS

De Lauretis G. Some Considerations on the Physiological Activity of the Myometrium (Alcune considerazioni sull'attività fisiologica del miometrio) *Riv ital di ginec* 1936 19 438

Among the functional attributes of the myometrium expansion and retraction have received much attention in the past. Sfameni has recently ascribed to the individual fibers of the uterus the property of tone. He reasons that since clinical observations show the volume of the uterus to be augmented both during the menstrual cycle and in ectopic pregnancy, the growth of the uterus must be regulated by a vital energy instead of a simple mechanical action of distention. He believes that the individual muscle fibers have a power of elongation and shortening which is independent of their contractile activity. The biological factors regulating growth of the gravid uterus consist of hypertrophy of muscle tubers and the ability of these fibers to expand. It appears possible that these functions are under the influence of specific hormones, one predominating in early pregnancy, exciting diastole and a later one exciting systole. Sfameni advances the theory that the state of the parturient uterine musculature immediately after the termination of a contraction is not a passive relaxation but a state of active decontraction. He believes that the various muscle fibers have an independent function which allows myogenic activity in one segment of the uterus while in another there may be an entirely antagonistic action. At term it is essential that these independent activities be in exact coordination and harmony for delivery.

By roentgenography after the introduction of an opaque substance into the uterus Gunter and Schultze showed the variety and multiplicity of mutations caused by foreign bodies introduced into the uterine cavity. Both spastic and peristaltic like contractions could be distinguished and the contractile activity of the uterus seemed to differ for each segment. The spastic contractions appeared to originate at the cornua, the internal os, and a saddle-shaped area over the fundus. The dynamics of the muscle fibers assumed not a simple peristaltic type of contraction, but a synergistic coordination of harmonious action which is indispensable for congruent function.

The author believes that enlargement of the uterus during pregnancy is not a uniform process. In the first six months it is nearly all in the fundus and corpus while in the last three months the development of the lower segment of the gravid uterus predominates. The development of the lower segment also shows lack of uniformity, the anterior portion of the segment increasing more than the posterior portion.

In the first two months of pregnancy the uterus assumes a pyriform shape, at the third month a spherical outline and after the fourth an ovoid form. In the author's opinion this demonstrates that it does not enlarge solely by distention to accommodate the fetal mass. The occurrence of enlargement more along the longitudinal than the transverse diameter is a purposeful development which determines the position of the fetus and any deviation from this special morphological development allows for abnormalities of presentation.

GEORGE C. PINOLA, M.D.

Laffont, A., Montpellier J. and Laffargue P. The Reactions of the Glands of the Uterine Cervix During the Course of Endocervicitis (Les réactions des glandes cervicales utérines au cours des ecto-cervicitis) *Gynec et obst* 1937 35 9

In the course of inflammation of the uterine cervix, especially the cervical canal, certain morphological and histological changes occur in the endocervical glands. These may be classified morphologically as follows:

1. Adenomatous polyps—granulomatous projections often arising at the edge of an ulceration.
2. Cystic glandular cervicitis—cystic dilatation of many of the cervical glands, the result of mild repeated infection.
3. Glandular hyperplasia, more or less adenomatous.
4. Metaplasia of the glandular epithelium.

Drawings and photomicrographs are presented to show the histological characteristics of these lesions.

The definite polyp of the cervix is well known. The earlier stage is pictured and described as a fleshy bud, a miniature polyp often arising at the edge of an ulcer. The epithelium covering the polyp is usually cuboidal or low columnar but may be stratified squamous or mixed. The mass of the polyp is a fibro adenoma.

In cystic endocervicitis the cysts vary in number and size. The lining cells are generally flat or cuboidal. Surrounding each cyst there is usually a condensed layer of connective tissue. There may or may not be evidence of inflammation.

In cases with glandular hyperplasia many varied pictures are found. The hyperplasia may be tubular, papillary, diffuse, lobulated or cystic. De-queratized epithelium is commonly present with infiltration of inflammatory cells. The epithelium must be studied for signs of precancerous lesions.

In epidermoid metaplasia of the cervical glands one usually finds only the mouth of the gland lined by stratified squamous epithelium which has replaced the columnar. One may also find however isolated areas deep in the gland lined by epidermoid cells, which probably represent transformations of the epithelium rather than replacement.

The authors are of the opinion that all these lesions develop as sequelæ of inflammation. Others believe that endocrine and constitutional factors may be etiologically important as well.

Changes in the stroma around the glands consist of signs of acute, subacute, or chronic inflammation. The cellular infiltration depends upon the intensity and nature of the reaction. Newly formed blood vessels are present in the acute and subacute stages, while fibrous thickening and hyaline changes in the walls are present in the later chronic stage.

In addition to the morphological changes in the epithelial cells there is often a decrease or absence of secretion, sometimes associated with inversion of the polarity of the cells. MAX M. ZINNINGER, M.D.

Chydenius, J. J. The Results of Radium Treatment of Carcinoma Colli Uteri. *Acta radiol.*, 1936, 17, 539.

The author reports the five year results in 226 cases of carcinoma of the cervix which were treated with radium at the Women's Clinic in Helsingfors in the period from 1926 to 1930 inclusive. In addition to these cases there were 54 hopeless cases which were not treated. The Stockholm method of irradiation was employed. Fifty nine of the women were well after five years. The absolute incidence of cure was therefore 21.1 per cent and the relative incidence of cure 26.1 per cent. In the 201 cases which were treated exclusively by irradiation, the incidence of cure was 20.0 per cent.

Over half of the cases (122) were in Stage 4. This is explained by the fact that the Women's Clinic in Helsingfors is the only polyclinic in Finland and therefore receives more advanced cases than clinics such as Radiumhemmet. Of the cases in Stage 1, 2, or 3 which were treated by irradiation alone, a five year cure was obtained in 72 per cent, and of 25 treated by radium irradiation and subsequent operation, a five year cure was obtained in 68 per cent. Of the 104 treated surgically including the 25 in which operation was preceded by irradiation, 50 were cured. Therefore 48 per cent of the patients whose condition was not practically hopeless from the beginning remained cured for five years.

The operative mortality was 1 death, and the radium irradiation mortality, 6 deaths. The deaths

following radium irradiation were due to peritonitis or sepsis. DANIEL G. MORTON, M.D.

#### ADNEAL AND PERIUTERINE CONDITIONS

Cotte, G. Ovarian Autografts in Gynecological Therapeutics (Quelle place faut il donner aux autogreffes ovariennes dans la thérapeutique gynécologique). *Gynécologie*, 1936, 35, 641.

The author discusses two principal indications for autotransplantation of the ovaries: the relief of tubular sterility, and the prevention of difficulties following castration.

In the former the ovary is transplanted into the uterus as a pedunculated graft. This type of graft is preferable to an intratubal graft as it is more favorable to pregnancy.

As castration is followed by cardiovascular, metabolic, psychic, and other disturbances Cotte urges conservative treatment. Whenever possible the uterus or a part of it should be conserved and at least one of the ovaries should be left *in situ*. This procedure is preferable to complete hysterectomy and ovarian grafting.

If conservative treatment is impossible ovarian grafts should be implanted in a new location. The author finds that his greatest number of successful results were obtained when the grafts were placed in the mesentery. He believes that mesenteric grafts are much more satisfactory than subcutaneous grafts. MARSH W. POOLE, M.D.

#### EXTERNAL GENITALIA

Den Hoed, D. Results Obtained in the Treatment of Malignant Tumors of the Vagina, Vulva, and Urethra. *Acta radiol.*, 1936, 17, 569.

From 88 cases of malignant tumors of the vagina, vulva and urethra, and a review of the literature on such neoplasms the author concludes that, in general, carcinoma of the vagina and urethra should be treated preferably by irradiation and carcinoma of the vulva by total vulvectomy with postoperative irradiation. When there are metastases in the inguinal glands the best results are obtained by complete extirpation. In very exceptional cases in operable patients may be cured by irradiation alone.

# OBSTETRICS

## PREGNANCY AND ITS COMPLICATIONS

Kellogg T S The Toxemias of Pregnancy *Am J Surg* 1937 35 300

Kellogg urges a universally accepted classification of the toxemias of pregnancy. Such a classification would permit the accumulation of sufficient data to raise treatment from the level of individual opinion and place it on a more rational basis. At the Boston Lying In Hospital toxemias are divided into (1) those presenting certain or presumptive evidence of disease independent of the pregnancy, and (2) those presenting no such evidence. The first group embraces the nephropathies associated with arterial vascular disease, the inflammatory nephropathies such as nephritis and pyelonephritis, and the degenerative nephropathies. The second group includes pre eclampsia and eclampsia.

In cases of essential hypertension striking variations in the behavior of individuals may be observed both in those who apparently have the same degree of disease and in the same patient during different pregnancies. In cases of low hypertension early in pregnancy the author recognizes no criteria on which to base a prognosis of the subsequent course. If an attempt is made to carry the patient through the pregnancy it is impossible to predict whether she will reach term or not, or to foretell whether she will emerge unscathed or with some permanent damage.

Acute glomerulonephritis is very rare and chronic nephritis is uncommon. Most women with mild chronic nephritis have complete compensation of renal function and pass through pregnancy successfully. In some cases there is no evidence of renal insufficiency until after the twentieth week of pregnancy, and in this group a differentiation from pre eclampsia appears to be practically impossible. Because of the high incidence of intra uterine death in cases of chronic nephritis it is generally advisable to take the child as soon as it seems to have a chance to survive rather than to let it grow larger *in utero*. Furthermore, it is safer from the point of view of intra uterine death to carry to term the patient with a relatively high hypertension and a low content of albumin in the urine, than the woman with relatively large amounts of albumin in the urine and a low hypertension.

All cases of pyelonephritis are included with the inflammatory nephritides. There is need for more careful study of this group so that there may be a clearer understanding of the relationship between urinary tract infections, the eclamptic state and the kidney of pregnancy. In cases of pyelonephritis an infection of the kidney parenchyma sometimes develops prior to the appearance of the pyelitis, but the extent of permanent kidney damage is variable. The treatment of pyelonephritis in preg-

nancy should be emptying of the uterus if the patient fails to show improvement after a reasonable trial of medical and genito urinary measures.

Nephrosis is almost impossible to diagnose during pregnancy.

Cases of pre eclampsia of Grade 1 include those with no evidence of disease, but with hypertension and/or albuminuria without other signs or symptoms. Pre eclampsia of Grade 2 is the same as pre eclampsia of Grade 1 except that it is accompanied by some or all of the signs and symptoms commonly attributed to the pre eclamptic state. Eclampsia is the same as pre eclampsia of Grade 2 with the addition of convulsions. Pre eclampsia of Grade 1 may go on to pre eclampsia of Grade 2.

The differential diagnosis of the nephropathies and pre eclampsia is an extremely important clinical problem but one which has proved baffling. Liver function tests are of no help. Studies of blood vessel changes in the eye grounds yield contradictory and inconclusive evidence. Kidney function tests are not dependable. The urea clearance is of value in following patients over a long period of time but not in the last months of pregnancy. The results of the "cold test" vary. The posterior pituitary test seems too risky. The findings of chemical studies of the blood, particularly an increase in uric acid and a decrease of the carbon dioxide combining power frequently fail to demonstrate the presence of pre eclampsia. Recently Smith has found that in the eclamptic state the curve for prolactin is abnormally high and that for estrin is abnormally low as compared with the curve in normal pregnancy, pregnancy with hypertension and chronic nephritis or diabetes. In at least 6 cases high values for prolactin were found six weeks before a clinical diagnosis of pre-eclampsia could be made.

Hofbauer's development of the posterior pituitary theory of eclampsia has not yet been proved. Bar tholomew and Kracke have presented a complete hypercholesterol explanation, and a further check of their findings and deductions will prove interesting. The importance of the nephropathies as a contributing cause of eclampsia must not be overlooked. Elimination of obvious foci of infection is held to be wise prophylaxis. Obesity is probably an important secondary etiological factor.

Few cases of pre eclampsia have come to autopsy at the Boston Lying In Hospital. However there seems to be sufficient evidence to justify the conclusion that pre eclampsia and eclampsia are the same disease at different stages of development. The only constant changes in eclampsia are found in the liver. They consist of subcapsular petechial hemorrhages with foci of necrosis which may be perportal, mid zonal or central. In over half of the cases corneal and subserosal hemorrhages have been found in the uterus. This is of importance in

the correlation of toxemias with premature separation of the normally implanted placenta.

Relative hypertension, albuminuria, edema, a sudden gain in weight, blurring of vision, nausea and vomiting constitute premonitory signs and of themselves are a sufficient indication for hospitalization of the patient. Increased respiratory depth, torpor, and irritability (mental or motor) are the final danger signals. Epigastric pain, convulsions, coma, and death within from thirty six to forty eight hours frequently terminate the picture. As the condition progresses at different rates of speed, the minimum requirements for proper prenatal care are a urine examination every week and a blood pressure and weight record every two weeks. A diastolic pressure of from 90 to 100 mm Hg is an important prognostic sign.

Eclampsia is limited by termination of its cause, pregnancy. At the Boston Lying In Hospital the mortality of antepartum eclampsia has been 33.6 per cent, whereas that of intrapartum and postpartum eclampsia combined has been about 17 per cent. Analysis of a large series of toxic patients has shown that those who were saved recovered because the progress of the disease was stopped before eclampsia supervened. When the toxic patient has convulsions her chance of dying increases from 25 to 25 per cent. The author therefore believes that the uterus of every pre eclamptic patient should be emptied before she has convulsions. In his opinion, torpor and irritability, especially physical irritability—best exemplified by vague scratching at an itchy nose—indicate the last stage at which interference is possible with a good chance of recovery. If signs and symptoms are progressive, he interferes irrespective of the baby. He is convinced that the treatment of pre eclampsia should be just as radical as the treatment of eclampsia should be conservative. He advises that the pre eclamptic be put to bed in a quiet room. Good sleep should be assured, and a light, mixed, salt free diet should be given. The bowels should be kept regulated and the fluids balanced. The patient should be seen often, her blood pressure recorded, and her urine frequently analyzed.

There should be no routine method of treating either the pre eclamptic or the eclamptic woman. Each case must be individualized. Every pre eclamptic woman nearing the stage of convulsions can be treated palpatively until her condition reaches the peak. In favor of immediate intervention is the mortality in antepartum eclampsia as contrasted with that in intrapartum and postpartum eclampsia. On the other hand, a patient at this stage of the disease is a poor risk for intervention, and interference may precipitate convulsions. Furthermore, brilliant results are sometimes obtained by plasma pheresis, venesection, or the administration of magnesium sulphate intravenously.

When the pregnancy is to be interrupted, Kellogg prefers abdominal hysterotomy unless the cervix is in an unusually favorable condition. He admits,

however, that the indiscriminate use of abdominal hysterotomy for pre eclampsia will give worse results in a long series of cases than rupture of the membranes with or without an oxytocic. In pre eclampsia, hysterotomy does not assure the birth of a living baby. This is true especially if the baby is premature.

It is generally accepted that, in eclampsia, a conservative method of treatment gives better results than active obstetrical intervention. Any treatment which may increase edema is unsound. The fluids must be balanced. Dehydration by fluid limitation deserves special consideration. Any agent which tends to reduce edema within safe limits is permissible, but magnesium sulphate, given intravenously or intramuscularly, is recommended since it most suitably fulfills this requirement. The author has been impressed by the experiences of Rucker. In 127 consecutive cases of eclampsia which Rucker treated with magnesium sulphate, there were only 6 deaths, a mortality of less than 5 per cent. Sharp individualization both of treatment and of the time of delivery, without deviation from the mother's interests for those of a child whose viability is uncertain, is absolutely essential. In all obstetrical manipulations the problem of anesthesia must be considered. Theoretically, anesthesia is contra indicated and, in practice, the manipulations may often be done without it.

A pregnant woman who is jaundiced had better not be treated obstetrically, but should be treated medically if any basis for medical treatment can be found. If she has acute yellow atrophy she will die and if she has catarrhal jaundice she may die of hemorrhage if delivered before she has recovered from that condition.

Perinatal vomiting of pregnancy cannot be included with certainty among the toxemias. Tube feedings in the duodenum and in the stomach after sufficient sedation solve the starvation problem. In the authors' last 59 consecutive cases there were no deaths and only 2 therapeutic abortions.

In the treatment of premature separation of the normally implanted placenta cesarean section is performed if the baby is in good condition and likely to survive. Otherwise tight cervical and vaginal packing is done and pressure applied over the fundus in the form of a Spanish windlass. Thereafter, reliance is placed on expectancy and symptomatic treatment. Some of the patients will die of toxemia no matter what is done, but when the described treatment is given they do not die of shock and the added hemorrhage which inevitably accompanies hysterotomy. It has been suggested that bleeding often stops after a simple rupture of the membranes.

In conclusion the author says that the problem of pregnancy toxemias should be approached from a common point of view with uniform terminology. Group study should invariably be conducted by close cooperation between the obstetrician, the internist acquainted with the cardio renal aspect of the

problem, and the pathological metabolic, and endocrinological laboratories

GEORGE H. GARDNER, M.D.

Contiades, V. J. Roentgenoscopic Study of Urinary Stasis in Pregnancy by Ascending Uretrography. Observations During the Middle Part of Pregnancy (*Étude radioscopique de la stase urinaire gravidique par l'uretéro-pyélographie ascendante. Observations de la partur moyenne de la grossesse*). *Gynec et obst* 1937 35 32

The study reported was made in the cases of 27 women between the fourth and seventh months of pregnancy. Eleven of the women were free from urinary infection and 16 were suffering from serious pyelonephritis. The findings were essentially the same in all varying only in degree. They consisted of dilatation of the renal pelvis, fusiform dilatation of the lumbar portion of the ureter, an increase in angulation with partial stricture at the superior strait and dilatation and an increase in the curvature of the pelvic ureter.

MAX M. ZINNINGER, M.D.

### LABOR AND ITS COMPLICATIONS

Mathieu, A. and Holman, A. The Results of Induction of Labor in 750 Cases from Private Practice. *Am J Obst & Gynec* 1937 33 268

After analyzing 750 cases of induced labor and comparing them with a consecutive contemporary series of cases in which labor was not induced, the authors conclude that the maternal and fetal morbidity and mortality were not increased by the induction. The induction was successful in 98 per cent of the cases. It was apparently not responsible for the occurrence of any pathological condition during labor or the puerperium. In the last 550 inductions, quinine was not used and the results were apparently not affected by its omission.

In the last 351 cases the membranes were ruptured artificially during the induction if labor did not start after 3 or 4 injections or if they had not already ruptured and there were no contra-indications to this procedure. This contributed markedly to the success of the induction.

In the last 114 cases castor oil was omitted and pentobarbital was given before the hypodermic injections were started. The omission of the castor oil in no way affected the success of the induction. Pentobarbital was of value in keeping the patient tranquil and free from pain. It did not interfere with the success of the induction and did not affect the vital statistics unfavorably.

In the total number of 750 cases was no instance of abruptio placentae or of fetal death due to cerebral injury or birth injury. The only prolapse of the cord occurred in the case of a patient whose membranes ruptured spontaneously.

As many of the cases in which labor was induced were probably cases in which difficulty was expected

because of such factors as toxemia, a large baby, and contraction of the pelvic outlet, the maternal morbidity and fetal mortality were surprisingly low. It appears that the induction greatly reduced the incidence of maternal morbidity and saved the lives of several of the babies. The combination of induction of labor with modern analgesia and anesthesia and with delivery by forceps after episiotomy appears advantageous as regards maternal and fetal morbidity and mortality.

In artificial rupture of the membranes there is danger of infection because of the necessary invasion of the vagina and uterus. Rupturing of the membranes is hazardous to the fetus if the head is not engaged. Prolapse of the cord is apt to occur unless the rupturing is done by an experienced obstetrician who can fit the presenting part into the pelvis as the amniotic fluid is lost and who will observe the fetal heart during the maneuver.

EDWARD L. CORNELL, M.D.

Vorlíček, Jelinek. Our Last Observations Concerning the Delmas Operation (Nos dernières observations concernant l'opération de Delmas). *Rev franç de gynéc et d'obst* 1936 31 1007

Delmas' method of evacuating the uterus at term was first described in 1928. Since then many reports on the procedure have appeared in the French literature. In 1934 the author's chief, Bittmann, reported 108 cases in which it was employed. In this article the author reports 26 additional cases from the same clinic. Delmas' chief contribution was apparently the use of spinal anesthesia for manual dilatation of the cervix and delivery of the baby. According to Delmas, spinal anesthesia causes disappearance of uterine contracture whereas it does not suppress and may even stimulate contraction and retraction. Spinal anesthesia suppresses the normal tone of the uterine cervix, thereby allowing painless manual dilatation with very little danger of laceration.

In the 26 cases reported in this article it was deemed necessary to hasten labor because of changes in the fetal heart sounds, an abnormal presentation or placenta previa. In most of them the cervix was dilated 2 or 3 fingers or more. Dilatation was completed either manually or by forcing the child's head down from above, a procedure easily accomplished under spinal anesthesia because of the relaxation of the abdominal wall. In most of the cases high forceps were used. In 5, version and extraction were done. Spontaneous separation of the placenta was the rule. In the majority of the cases the puerperium was normal.

In the total number of 134 cases reported by Bittmann and the author the maternal mortality was 2.24 per cent (3 deaths) but 2 of the deaths were due to causes other than the operation. The maternal morbidity was 8.20 per cent (11 cases). Exclusive of the deaths of 5 infants which were born alive before term, the infant mortality was 4.4 per cent (6 deaths).

The author concludes that the Delmas operation is very valuable in selected cases and not dangerous to either the mother or the child when performed skillfully  
 MAX M. ZINNIGER, M.D.

### NEWBORN

Normark, A. The Treatment of Pemphigus Neonatorum (Ueber die Behandlung des Pemphigus neonatorum) *Upsala Läkaref. Forh.*, 1936 42 309

Pemphigus neonatorum is a contagious vesicular pyoderma due to the staphylococcus pyogenes aureus. The individual lesions heal within a few days even without treatment, but the disease is maintained by the inoculation of new skin areas by the virus contained in the bursting vesicles. Hence the aim of treatment must be the prevention of the autogenous infection. Opinions differ as to the method by which this can be best accomplished.

Some of the methods advised depend primarily upon the physical properties of powders, pastes, and emulsions, the aim being to prevent dissemination of the virus thereby in a mechanical way, and secondarily upon the disinfecting power of such substances. Some Americans prefer the use of antiseptic solutions. Others use various dyes, alcohol, mercuric chloride solution, and antiseptic ointments. Occlusive dressings, drying powders, artificial heliotherapy, and vaccines have been recommended. The results of the different treatments have been reported variously, and it is difficult to say which is the best method. The malignancy of the disease varies considerably in the epidemics. An apparently malignant case may terminate in recovery with little treatment in a relatively short time, while an at first apparently mild case may be very resistant to treatment.

It may well be claimed that as a rule the methods which aim to prevent dissemination of the virus by isolation of the existing efflorescences yield better results than those which depend primarily upon disinfection of the skin. Consequently better results are obtained with the occlusive treatment, which affords better isolation, than with powders and pastes. Poor results from the use of occlusive dressings are caused by incomplete occlusion, mechanical irritation of the skin, and moisture and maceration of the epithelium. Large dressings will produce heat.

In the pediatric clinic of the Academic Hospital in Upsala the author treated 17 cases of pemphigus neonatorum as follows:

The infants were kept dry constantly, but unnecessary handling was avoided. The skin was carefully examined for vesicles. When a vesicle was found it was covered with a piece of leukoplast large enough to extend 1 cm. beyond its edges. Small vesicles were covered directly, but large ones were first crushed between sterile dry or alcohol compresses. The rest of the infant's body was thoroughly powdered with 1 per cent rivanol talcum. Some of the infants were given a potassium permanganate bath. While the number of these was too small for judgment of the effects, it seems better to omit the baths.

The results were good. The infants treated with adhesive plaster showed fewer vesicles than those given open treatment. The appearance of new vesicles was probably due to too late isolation of the primary efflorescences. In a few cases no second crop of vesicles was formed. In the cases treated by occlusion the duration of treatment was from four to six days less than in cases treated by other methods.

LOUIS NEUWELT, M.D.

# GENITO-URINARY SURGERY

## ADRENAL, KIDNEY, AND URETER

Gabrielli S., and Girsensohn H. The Influence of Urinary Stasis upon the Diffusion of Septic and Aseptic Pelvic Contents into the Renal Parenchyma (L'influsso della stasi urinaria sulla diffusione nel parenchima renale del contenuto pelico asettico e settico) *Arch Ital di urol* 1936 13 519

Gabrielli and Girsensohn state that urinary stasis is undoubtedly one of the most important factors in the pathogenesis of renal lesions. While there is an extensive literature concerning the mode of diffusion of the contents of the renal pelvis into the renal parenchyma little is known regarding the propagation of inflammatory processes originating in the renal pelvis because the true relationship between urinary stasis and ascending renal infection has never been clearly elucidated.

To determine the mode of invasion of the renal parenchyma the authors used a series of rabbits. The animals were killed and the kidney, ureter and renal vein exposed and dissected out. A small cannula was then introduced into the proximal portion of the ureter and 1 or 2 c cm. of India ink were injected.

In agreement with other investigators the authors found that in the rabbit a sudden increase of the intrapelvic pressure causes a rupture at the angle formed by the renal papilla and the calyx (fornix), followed by invasion of the lymphatic and venous channels. However such a rupture does not occur if as the result of urinary stasis, the forementioned structure assumes a rounded form or if a hydronephrotic atrophy sets in. These anatomical changes are found to be present at the end of the first week following ligation of the ureter but may be observed during the course of the second week in animals with a ureteral stenosis.

In the normal rabbit the system of tubules in the kidney usually does not become injected. In general the authors found that the rounding out of the angle formed between the renal papilla and the calyx (fornix) offers resistance to rupture. The pressure in the renal pelvis may become so high that it overcomes the forces which cause closure of the renal papillae. A tubular injection then results and increases in proportion to the degree of dilatation of the renal pelvis.

With regard to the diffusion of infected pelvic contents the authors state that in a normal kidney infection occurs very rarely. Pyelitis is almost always transmitted to the lymphatic system by way of the angle formed between the calyx and the renal papilla. This lymphogenic extension takes place in all cases of urinary stasis provided the angle formed by the renal papilla and the calyx does not become obliterated as the result of a progressing hydrone-

phrosis. In cases of hydronephrosis the lymphangitis is completely masked because of the rapid bacterial invasion of the uriniferous tubules. In a few hours the organisms usually reach the renal cortex where they set up inflammatory changes.

If an infection of the pelvis is produced in a normal kidney and there is a contemporaneous urinary stasis, rupture occurs at the angle formed between the renal papilla and the calyx on the second or third day following ligation of the ureter. The diffusion of the pelvic contents produces in turn a phlegmon of the renal hilus and at the same time the infection spreads by way of the tubules and more slowly by way of the lymphatics.

RICHARD E. SOMMER, M.D.

Twinnem F. P. A Study of Recurrence Following Operations for Nephrolithiasis. *J Urol* 1937 37 259

The author reviews 314 cases in which operation was performed for nephrolithiasis. Recurrence occurred in 28 per cent of those treated by nephrotomy and 20.9 per cent of those treated by pyelotomy. Its incidence was greater in cases of multiple stones than in those of single stone. As pseudo-recurrence is fairly common, Twinnem advises roentgen examination on the operating table especially in cases of multiple or staghorn calculi. In the reviewed cases cystine and phosphatic stones recurred most frequently.

Among the factors responsible for recurrence are infection particularly by the bacillus proteus and hyperparathyroidism.

Twinnem outlines general and specific measures for the prevention of postoperative recurrence of renal stones.

DONALD K. HINES, M.D.

Herbst W. P. Surgical Procedures in Neurodynamic Pathology of the Upper Urinary Tract. *J Urol* 1937 37 249

The author presents his conception of the renal sympatheticonus described by Harris and of the abnormal syndrome of the upper urinary tract which he described in 1932 and called hyperdynamic activity. He states that renal sympatheticonus is best recognized from a history of colicky pain in the region of the kidney or ureter without abnormal findings on urinalysis and by serial urography. Hyperdynamic motility is demonstrated by inability to fill the renal pelvis and ureter adequately by the retrograde method. Mechanical difficulty can be differentiated definitely only by its demonstration under direct vision.

In the treatment of renal sympatheticonus and hyperdynamic motility an attempt should be made to relieve the pain by the use of eserin, pituitrin, quinine and aspirin. Relief of nervous strain and anxiety is important. Surgical treatment consists

of renal or ureteral sympathectomy. The author believes that when there is dilatation of the ureter or renal pelvis this will decrease. He considers the effect of presacral neurectomy uncertain.

In the discussion of this report, WHARTON cited similar experiences in denervation of the ureter and stated that 75 per cent of the patients whom he had treated by ureteral denervation were completely cured.

KEYES emphasized the lack of knowledge regarding hyperacidity of the urine and the psychological factors present in many cases of renal pain.

DONALD K. HIBBS, M.D.

Sen S. K. Some Observations on Decapsulation and Denervation of the Kidney. *Brit J Urol*, 1936, 8, 319.

Sen discusses the value of decapsulation and denervation of the kidney based on the results of 85 cases in the department of Lichtenstern in the Kaufmann Hospital of Vienna. The clinical diagnoses in the majority of the patients were perinephritis, hematuria of focal nephritis, nephritis, and hemorrhagic nephritis. Sen quotes the statement of Fischer, that the sympathetic nerves to the renal capsule act as a reflex regulation apparatus for the blood flow through the kidney. Decapsulation of the kidney in essential hematuria often gives good results, and the author believes that if this type of kidney were thoroughly examined, some type of lesion would always be found. Many state that decapsulation induces a considerable decrease of the blood pressure, but in the experience of Sen this is only temporary, so no permanent success is obtained.

The author performs the operation under local anesthesia and leaves the kidney in place because he believes it is very important not to damage the kidney by traction or pressure. The capsule is incised on the convex border and stripped toward the hilum by blunt finger dissection. He does not believe it is essential to denervate the hilum vessels. Rubber tube drainage of the wound is important because of the abundant lymph flow following operation.

FRANK M. COCHENS, M.D.

#### BLADDER, URETHRA, AND PENIS

Randall, A., and Campbell, E. W. Alkaline Incrusted Cystitis. *J Urol*, 1937, 37, 284.

Randall and Campbell report 5 cases of alkaline incrustrated cystitis in female patients who were free from obstructive lesions. They call attention to the variability of the pH of the urine from the two kidney pelves and state that the ideal method of relieving the symptoms of this type of cystitis and obtaining a permanent cure is acidification of the entire urinary tract regardless of the causative organism. Drugs given by mouth and acid producing diets are not sufficient to acidify the urinary tract in the presence of alkaline incrustrated cystitis. Supplementary irrigations with an acid solution are necessary. Phosphoric acid has proved to be the most satisfactory.

A 1 per cent solution is used for the bladder and a 2 per cent solution for the renal pelves. Weaker solutions may be necessary at first. The authors do not favor the implantation of acid producing organisms into the urinary tract. FRANK M. COCHENS, M.D.

Siddall A. C. Primary Vesical Calculus. *J Urol*, 1937, 37, 268.

Siddall presents the findings of an etiological study of cases of vesical calculus treated at the Canton Hospital, China. He discusses the incidence of various endocrine diseases in South China and concludes that these conditions are of no importance in the formation of vesical stones. In the reviewed cases of vesical stone there was no evidence that the patients were suffering from a deficiency of Vitamin A, B, or D. Chemical analysis of the stones showed the nuclei to be composed of uric acid, urates, and oxalates. As it is known that the hard working farmers of South China have a transient recurrent albuminuria, Siddall believes that this, together with an increased intake of food which increases the excretion of oxalates in the urine, may form the nuclei for primary vesical calculus.

DONALD K. HIBBS, M.D.

Ward B. Total Cystectomy with Transplantation of the Ureters into the Pelvic Colon for Malignant Growth of the Urinary Bladder. Based on an Experience of 7 Successful Cases. *Proc Roy Soc Med Lond*, 1936, 30, 137.

Ward gives an excellent treatise on total cystectomy with transplantation of the ureters into the pelvic colon for malignant growths of the urinary bladder. He has had successful results in 7 cases in the past eleven years. He chooses the patients for this type of operation carefully. They must present a definite indication, such as infiltrating growths of the base and neck which have not metastasized. There must be sufficient renal function and the ureters cannot be too dilated. The patient must be in fair general health in order to withstand so extensive an operation. Ward has developed a modification of the Coffey technique, which is as follows:

After the ureter has been freed and detached from the bladder, its lower end is split up on 1 side for  $\frac{3}{4}$  in., a catgut suture is passed through its extreme tip and one end is cut short, the other end is left attached to a curved intestinal needle. A 6 in. length of rubber catheter, which just fits the lumen of the ureter snugly, is then passed up the lumen for 3 in. and 3 in. is left hanging out, it is not fixed to the ureter in any way. The bed in the bowel wall is prepared according to Coffey's method, by exposing the mucous membrane by means of an incision  $\frac{1}{2}$  in. in length through the peritoneal and muscular coats. An opening is then made in the mucous membrane at its lower end, just large enough to take the ureter. The needle and catgut attached to the ureter are passed through this opening and brought out through the bowel wall about  $\frac{1}{5}$  in. below the end of the incision. The catgut is then



portant problem from the legal and general humane standpoints. The operative treatment does not always give satisfactory results. The object of the operative procedure is to make the sexual organs adaptable for sex life. Attempts to produce improvement in the rudimentary sex glands are unsuccessful and since the rudimentary glands are disposed to undergo tumorous degeneration and exert only a very slight hormonal influence the author believes it is best to remove them.

The external genital organs may be made adaptable for sex function by various plastic methods. When the feminine character is to be stressed the penislike clitoris is removed and the narrowed vagina is widened and in some instances a new vagina is formed by employing the small intestines or the rectum.

In order to obtain the male sex characteristics the penis which is bent downwards is straightened out the narrow blindly ending vagina is either removed or closed a new urethra is formed, and in some cases a scrotal sac is also formed from the labium majus. As to the internal sex organs removal of the rudimentary uterus and structures resembling the ovaries is often necessary.

(E ILLES) HARRY A. SALZMANN, M.D.

Spangaro C. Myomatosis of the Prostate as a Pathogenetic Factor in the So Called Hypertrophy of the Prostate (La miomatosis della prostata quale fattore patogenetico della cosiddetta ipertrofia prostatica) *Clin. chir.* 1936 12 825.

The author describes the development of the prostate through the different stages of life and then presents a detailed discussion of cases of prostatic hypertrophy which he illustrates with photomicrographs. He concludes that in quite a high percent age of prostates a progressive change which may be considered pathological occurs after the fifth decade. This is the so-called hypertrophy. It consists of a tumoral proliferation of the smooth muscle tissue which by mechanical action causes first stagnation of the secretion and then dilatation of the alveoli with consequent flattening of the epithelial cells.

Though he admits a possible concomitant proliferation of these cells under the stimulus of the newly formed muscle tissue he thinks the lesion is predominantly a primary myoma of the stroma of the prostate gland followed by dilatation of the gland cavities. He therefore proposes calling the condition senile cystic myomatosis a term which he thinks is more descriptive of the complex process than the terms hypertrophy or adenoma of the prostate.

AUDREY GOSS MORGAN, M.D.

Kolmert F. Cancer of the Prostate (Cancer prostatae) *Uppsala Läkartidn.* 1936 42 285.

The author reports a clinical study of 75 cases of carcinoma of the prostate which were treated at the surgical clinic of the University of Uppsala during the period from 1923 to 1935. Only cases with a definite diagnosis were included. The 67 patients

who died were between fifty four and eighty-eight years of age, 49 were between sixty four and seventy eight years. The onset of symptoms occurred between the fifty fourth and eighty third years of age in 40 cases the disease started between the sixty fourth and seventy third years. In the majority of the cases the duration of the disease was from two to three years.

The symptoms were principally those of hypertrophy of the prostate. The author states that cancer should be suspected when the patient gives a short history of burning and pain on urination without a previous history of dysuria. Pain in the back and legs and hematuria are not early signs. The metastases are usually osteoplastic bone metastases in the lower part of the spine, the pelvis and the upper part of the femur.

Bone metastases occur even in carcinoma developing from a benign adenoma. Of the patients whose cases are reviewed 23 (nearly one third) had metastases at the time of their admission to the hospital. Of these 15 had had urinary disturbances for six months at the longest and 2 had never suffered from such disturbances.

A positive diagnosis of cancer of the prostate can seldom be made on the basis of the findings of palpation alone. The author suggests the Barringer method of puncture of the prostate and Young's method of rectal palpation against the cystoscope. Of the 75 cases reviewed 11 were not diagnosed before operation.

Twenty six of the patients were operated on. Of the 4 deaths related to the operation 3 were due to pulmonary embolism. Fifty per cent of the patients treated surgically came to operation with a diagnosis of hypertrophy of the prostate. The longest duration of life after operation was three and a half years.

In the cases of patients who could not be operated on and of those with recurrences or metastases x ray treatment was given to prolong life. Irradiation proved superior to other treatment for prolongation of life and relief of the symptoms. Of the patients operated upon 50 per cent developed a recurrence or metastases. LOUIS NELWELL, M.D.

Van Bogaert L. Van Cauteren C. and Scherrer H. J. The Generalized Plastic Form of Metastases from Cancer of the Prostate (La forme ostéoplastique généralisée des métastases du cancer prostatique) *Presse méd.* Par 1936 No 92 1816.

The authors report a case of bony changes occurring in the spine pelvis ribs and long bones of a man forty four years of age. The symptoms were pain which at first was limited to the extremities but later occurred in other parts of the body. The x ray findings and clinical symptoms were those of Paget's disease of bone. Only once during the period of observation were there any urinary symptoms. These were quickly relieved by urotropin.

Autopsy disclosed a very small hard carcinoma of the prostate with extensive metastases in the ab-

dominal lymph glands, liver, lungs, and almost the entire skeleton

The authors state that in Paget's disease as compared with osteoblastic carcinoma the general condition remains better and the cachexia of malignancy is not present. The bony changes are of a more fragile type and not of the ivory like character of those occurring in the latter condition. The high blood phosphorus found in Paget's disease is not diagnostic as in their case of prostatic carcinoma the blood phosphorus was from 8 to 10 times the normal.

THEOPHIL P. GRAUER, M.D.

Nitch, C. A. R. The Conservative Treatment of Carcinoma of the Prostate. *Brit J Urol*, 1936, 8, 329

Operative measures for the radical cure of carcinoma of the prostate can be carried out only in a small proportion of the cases. In the author's experience the results of radical operation are disappointing. Conservative treatment comprises (1) irradiation, (2) surgery, and (3) surgery combined with irradiation.

The best results from x-ray therapy are obtained by the 5-field maximum method of Holfelder and Reisner. The immediate results of x-ray therapy are often excellent, but the ultimate results are disappointing.

The results from radium therapy are better. The author applies 14 mgm. of radium on the posterior and lateral surfaces of the prostate by inserting needles after perineal exposure of the prostate. He also applies 50 mgm. to the vesical surface of the prostate by means of a metal box, and 5 mgm. to the prostatic urethra by insertion.

Conservative surgery consists of ureteral transplantation, either into the bowel or the skin, when the ureteral orifices become involved in the cancer, and suprapubic cystotomy or transurethral resection for palliative relief of bladder neck obstruction.

It is probable that in the future electroresection followed by some form of irradiation, will be the method of choice.

THEOPHIL P. GRAUER, M.D.

### MISCELLANEOUS

Carroll, G. Lewis, B., and Kappel, L. Mandelic Acid as a Urinary Antiseptic. *J Am M Ass*, 1936, 107, 1796

The authors report their clinical experience with 50 cases of pyuria treated by mandelic acid therapy. Their method of administration of the drug is out-

lined. They believe that the results obtained indicate that mandelic acid is definitely superior to other drugs in urinary infection. Apparently it is most effective against the colon bacillus and less effective against the staphylococcus bacillus proteus, and bacillus pyocyaneus.

In a large percentage of their uncomplicated cases the "sterile urine" yielded cultures in from four to twelve days. Manifestly, cases of renal stones, linked ureter due to movable kidney, prostatic hypertrophy, bladder diverticula, and stricture of the ureter or urethra—all found in the group studied—required more treatment than the administration of mandelic acid, but the latter, when indicated, was found most helpful in decreasing the operative risk, making the patient more comfortable, and shortening the length of the illness.

JOHN G. CHEETHAM, M.D.

Dolan, L. P. Experiences with Ammonium Mandelate in Urinary Infections. A Report of Results Obtained in 16 Cases of Various Types of Infections Regardless of the Existing Pathological Condition. *J Am M Ass*, 1936, 107, 1800

The author describes his experience, reporting in detail 16 cases of various types of urinary tract infections which he treated with ammonium mandelate. He gives a bacteriological summary, and concludes that colon bacillus infection yields more readily to ammonium mandelate than to the other drugs usually employed. He notes also that although the colon bacillus infections respond very satisfactorily, the coccus infections do not respond so readily.

While mandelic acid appears to be more effective in cases of urinary infection unassociated with urinary obstruction, the author reports 3 cases in which obstruction was present, and the therapeutic results were very good. The author believes that the apparent cure resulting in these 3 cases was due to the fact that the drug was held in place longer, thus giving its bacteriostatic powers a longer time in which to function. The same reasoning seems logical in cases of diverticula of the bladder in which good results were obtained.

Because of the short period of time that these cases were followed, the good results were designated as apparent cures. Recurrence has been noted in some instances. Possible complications, such as hematuria, must be kept in mind.

JOHN G. CHEETHAM, M.D.

# SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS

## CONDITIONS OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC

Levine R S Dyschondroplasia (Ollier's Congenital Dystrophy) (Dyschondroplasia—Perturbation de la croissance d'Ollier) *Rev d'orthop* 1937 24 30

Levine states that very few cases of the dyschondroplasia first described by Ollier in 1899 have been reported in the literature To 28 collected cases, including the first 2 described by Ollier he adds the case of a four year-old girl In the latter shortening and enlargement of the right leg were first noticed when the child began to walk at the age of thirteen months Roentgenological examination showed changes typical of Ollier's dyschondroplasia which were most extensive in the bones of the right lower extremity

The author describes the symptoms and pathological changes in dyschondroplasia on the basis of his own case and the 28 cases he has collected

The condition is found only in children As a rule the child is otherwise in good health The age at which the children have come under medical observation has varied from two and a half to thirteen years However, the characteristic shortening of the limb is usually observed by the parents when the child begins to walk as in the author's case No evidence of hereditary transmission of the condition has been found

The limb affected shows shortening and enlargement Because of the shortening of the limb deformity of the joints occurs Of the cases reported to date 4 have shown genu varum 6 (including the author's case) genu valgum and several (including the author's case) coxa valga or talipes valgus or varus It is to be noted that when operation has been done for genu valgum the origin of the deformity has not been discovered This was true in the case of the author's patient who had been operated at the age of two years and ten months and also in a case reported by Jansen in which two operations had been done for the knee deformity Palpation may show thickening of the metaphyses of the long bones but if the small bones of the hand or feet are affected no thickening is palpable

The condition is entirely painless On neurological examination the reflexes and sensation are found normal There is neither muscular atrophy nor paresis Although it was formerly supposed that only one side of the body was affected recent investigations have shown that there may be multiple lesions in many parts of the skeleton Both extremities or only the lower extremity, on one side or both lower extremities may be affected According to Bojesen's statistics the condition is more frequent in girls than in boys In a number of cases asymmetry of the face has been noted

The roentgenological findings are typical showing multiple hunchæ in the bone of different shapes and sizes, isolated or in groups These are seen in the center of the bones or at the metaphyses of the long bones or the diaphyses of the small bones The borders of the areas are clearly defined The areas show no definite structure and no periosteal reaction The disease is located most frequently in the femur and the tibia, and next most frequently in the metatarsals metacarpals phalanges, the iliac bone the radius the ulna the scapula, and the ribs It is only occasionally that the calcaneum the os pubis or the ischium (author's case) is affected Jansen reported involvement of the bones of the skull In no case has there been involvement of the clavicles or the vertebrae

Of the 29 recorded cases specimens were obtained for examination in 7 In the author's case the specimen was obtained from the crest of the ilium in 27 cases from the metaphysis of the tibia and in 1 case from a finger The histological picture showed a cellular hyaline cartilage In some cases there was a lobular arrangement, in others the cells were enclosed in capsules In the author's case encapsulation of groups of cells was observed The structure resembles that of a chondroma, but signs of inflammation or malignancy have never been observed

The diagnosis of dyschondroplasia can be made only by roentgenographic examination The condition should be suggested by the occurrence, in a child of shortening and deformity of an extremity without definite cause The roentgen picture is quite characteristic differing from that of atypical bone tuberculosis, von Recklinghausen's disease and rickets It resembles most closely the picture of multiple chondromatosis However multiple chondromatosis is rarely found to be localized in the long bones

Dyschondroplasia is considered due to some interference with the normal process of ossification in the fetus Recent investigations have indicated that the cause may be a trophoneurosis

The prognosis of dyschondroplasia with regard to life is good Patients who have been under observation for several years have shown that the condition is benign and that new foci do not develop In some cases the focal lesions have diminished in size and in a few have been replaced by normal bone

The author examined his patient twenty months following the first examination No new lesions had developed but the original lesions showed no change As the normal limb developed the shortening and deformity of the affected limb became more marked The use of orthopedic appliances is often necessary because of the deformity

ALICE M MEYERS

Artus Cristiani, C. The Traumatic Etiology of Myositis Ossificans (Les myosites ossifiantes, leur étiologie traumatique) *Lyon chir.*, 1937, 34  
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After briefly reviewing the literature on myositis ossificans, the author reports 2 cases in detail. He defines the condition as intramuscular bone formation following single or repeated trauma. The types of single trauma include external blows, fractures, and sudden muscular contractions leading to rupture. Among the repeated insignificant traumas which may cause the condition are those of the thighs of equestrians, the biceps of athletes, the flexor muscles of the arms and shoulders of soldiers, and the prepubic region of boot and saddlemakers. The location of the pathological bone formation depends upon the subject's occupation, the special disposition of certain muscles, and predisposition. The condition occurs most frequently in young males. The trauma is followed by rapid induration of the muscle in direct proportion to the degree of the injury. As a rule the bone formation may be demonstrated at the end of from two weeks to two months. It may pass unnoticed or be manifested by limitation of movements and pain or be discovered by roentgenological or pathological examination. If the osseous new formation is connected with the skeleton, such conditions as exostosis and ossification of proliferating cicatrices must be ruled out. The lesion may be united to the skeleton by a fibrous process or may be isolated in the muscle as a metaplastic process.

The intramuscular bony lesion varies in size. As a rule it does not exceed the size of a fist, but in some cases may attain 20 cm. It varies also in shape, but in extent it never surpasses the injured area. It develops at the site of the hematoma, which is supposed by some to be a predisposing cause. It may be surrounded by a capsule or made up of fragments separated by connective or muscular tissue. The bone formation may occur either by direct transformation of connective tissue (fibroplastic ossification) or by transformation of cartilage (enchondral or chondrometaplastic ossification). When the homogeneous fundamental substance absorbs calcium the identity with bone tissue becomes complete. Between the trabeculae a marrow develops. This may be fascicular, fatty, or gelatinous. The elements of true bone marrow are rare. Giant stellate cells on the surface of the trabeculae correspond to the osteoclasts of skeletal bone. As a rule the structure is irregular, but occasionally it shows a tendency to be lamellar and sometimes shows even a primary and secondary haversian system. The bone cells are larger than normal. Occasionally the bony mass is covered by a fibrous membrane and surrounded by muscle fibers, many of which are markedly altered.

The author gives a detailed review of experimental studies and theories of the pathogenesis of the condition.

In the first case he reports, that of a man sixty six years of age, a hematoma developed following a fracture of the femur. Four weeks after the injury a roentgenogram showed that muscular interposition was hindering union. Operation revealed extensive myositis ossificans of the vastus and adductor muscles. A few days later the patient died of intercurrent disease. Autopsy confirmed the diagnosis.

The author's second case was that of a man twenty three years of age who was kicked by a horse on the anterior surface of the right thigh. As the pain seemed to be increasing after several weeks, an examination was made. Palpation revealed a hard tumor adherent to the deeper layers. On its removal about three months after the accident, the tumor was found to contain 2 fragments of bony tissue. Microscopic examination showed periosteum surrounding a cortical area traversed by haversian canals, trabeculae limiting a fatty marrow, a cartilaginous zone, and a zone of transition from cartilage to bone. EDITH SCRAHNE MOORE

McGregor, I. Rotation at the Shoulder *Brit J Surg* 1937, 24 425

The author analyzes the movements at the humeroscapular joint. He states that rotation of the head of the humerus receives little attention in modern surgical textbooks. Martin, in 1932, showed that, whereas abduction of the humerus to a right angle can be carried out whether the bone is rotated in or out, the second 90 degrees of abduction cannot be effected unless the humerus is fully rotated outward. During the second 90 degrees of abduction the greater tuberosity of the humerus comes into contact with the acromion and the coracoacromial ligament, and further abduction can occur only if the tuberosity slides under the acromion, which it can do only by passing backward (lateral rotation of the humerus).

For full flexion of the arm to the vertical, internal rotation is essential. The reason is that, when the arm is flexed in external rotation, the lesser tuberosity of the humerus covered by the subscapularis impinges against the costocoracoid ligament and can roll under this obstruction only by rotating in.

Since flexion of the arm is as dependent upon internal rotation as abduction is dependent upon external rotation, a mid position of the humerus should be sought. In the mid position between right-angled abduction and right-angled flexion the humerus can be elevated to a right angle and a half, whether the bone is rotated in or out.

With regard to rotation of the humerus with the arm in different positions, the author states that, when the arm is vertical, no rotation is possible, but as soon as the limb begins to move downward, whether in the frontal or sagittal plane, rotation may occur and its range increases until the maximum is attained with the limb dependent.

Consideration of the actions performed daily shows that human beings seldom use the move



The mid position of the humerus. This is the optimum position for the treatment of most lesions of the shoulder joint.

ments of pure flexion or abduction but move the humerus in some plane between these extremes, the most generally useful being a plane about midway between them.

The position most widely accepted as the optimum position for the treatment of lesions of the shoulder joint not considered likely to end in ankylosis is right angled abduction with full external rotation. In discussing the disadvantages of this position the author states that because of the anatomical features of the joint particularly the osseofibrous arch which overhangs it and the large tendons and muscles which lie on or are incorporated with, the joint capsule there is normally only just enough room for the execution of the complex movements of the humeral head beneath the overhanging arch. When the joint is sprained there is an infiltration in and around the joint capsule so that movement at the joint causes pressure by the overhanging arch on exquisitely sensitive structures. With an increase in the pressure the pain becomes more severe. The pressure is greatest where tendons attached to the tuberosities pass under the coraco-acromial arch in the position of right angled abduction. External rotation introduces the added factor of tension on the ligaments on the front of the joint and the medial rotators such as the subscapularis.

The position for the treatment of acute injuries of the shoulder joint should place the abductors at rest, relax the injured muscle and prevent adhesions in the dependent pouch of the joint capsule. Moreover it should be such that if stiffness occurs the disability will be minimal. The author believes that, on anatomical, physiological and functional grounds the optimum position is the mid position in which the arm is at right angles to the body, midway between the position of right angled abduction and right angled flexion and the forearm is in mid position between full external and full internal rotation. In this position the supraspinatus and the biceps are relaxed. As neither of the tuberosities of the humerus is engaged beneath the coraco-

acromial arch pressure is avoided and as the capsule and its ligaments and the rotators of the joint are relaxed, tension is prevented.

HARVEY S. ALLEN, M.D.

# Grinnell R. S. Acute Suppurative Tenosynovitis of the Flexor Tendon Sheaths of the Hand *Ann Surg.* 1937 105 97

Grinnell has carefully reviewed a series of 125 cases of tendon sheath infections. In 92 per cent of the cases the infection followed trauma which was usually insignificant in character. In 47 per cent the wounds of entrance were in or close to the flexor creases of the fingers. Infection or injury in the distal closed space accounted for 19 per cent of the series. The right hand was involved twice as often as the left.

Early diagnosis of tendon sheath infection is important. Primary infections, when implanted directly into the sheath, showed classical signs of tendon sheath involvement. Secondary infections in which the sheath was involved by extension from a neighboring infection were more difficult to diagnose. Failure to recognize tendon sheath infection at the outset and consequent delay in operation are probably the main causes of the poor results.

The results in this series are divided into 4 groups suggested by Cleveland. More than one third of the cases (35 per cent) fell into Group 1, poor results which include death, amputation and deformed stiff, often painful fingers without motion at the interphalangeal joints and little at the metacarpophalangeal joint. Forty eight per cent were classified as belonging to Groups 2 and 3, fair and good results with from nearly complete to complete motion at the metacarpophalangeal joint and no motion to slight active motion at the interphalangeal joints. Seventeen per cent belonged to Group 4, with an almost complete return of function.

Tendon necrosis found in 52 per cent of the cases occurred more often in secondary than primary types. The comparison between the incidence of tendon slough and the results showed a close relationship. Eighty nine per cent of the cases in Group 1 presented tendon necrosis.

*Streptococcus hemolyticus* was present in 45 cases, a *staphylococcus* in 39 and mixed infections in 13. The cases of mixed infections presented poor results. Tendon necrosis occurred about equally as often in *staphylococcus* as in *streptococcus* infections but much more frequently in mixed infections. A *staphylococcus* was present more frequently in secondary tenosynovitis.

The best results were found in the thumb and the poorest in the fifth finger.

There were 13 cases of radial bursitis in which the results were surprisingly good while 8 cases of ulnar bursitis showed very poor results. In 10 cases of infection of both the radial and ulnar bursa the results were extremely poor. In all but one of the last cases the infection spread from the radial to the ulnar bursa.

The average duration of the tenosynovitis before operation was 6.2 days. The average delay before operation in Group 4, with resulting normal function, was 3.4 days as compared to 0.3 days in Group 1, with poor results. The comparison of cases with and cases without tendon necrosis showed the importance of the time factor. The poor results were found in the old age group. Likewise tendon necrosis was more frequent in this group.

The results of post operative treatment indicated that sterile wet dressings gave better results than soaking the hand.

Only 1 death occurred in the series. There were 3 arm and 8 finger amputations. The author states that a stiff finger if ankylized in optimum position is more useful and preferable than an amputation stump. The thumb should never be amputated.

Osteomyelitis occurred in 38 per cent of the cases and was often multiple. The middle phalanx was involved most frequently. Suppurative arthritis, usually in the distal interphalangeal joint, occurred in 29 per cent of the cases.

The streptococcus hemolyticus was the responsible organism in most of the severe complications. It was present in 3 cases of tenosynovitis secondary to human bites on the dorsum of the hand. All 3 cases showed extensive tendon sloughing, osteomyelitis, and suppurative arthritis and the results were poor.

Extension of the infection from the sheath to the fascial spaces of the hand occurred frequently. The thenar space was involved in 15 cases and the mid-palmar, in 4. Extension into the soft tissues of the arm occurred 9 times, but added little to the later disability. Extension from the volar to the dorsal surface of the hand occurred in 10 cases, by way of the lumbrical muscles, the webs, and the joints. Extension from the dorsal to the volar surface occurred only in 3 human bite cases.

In the surgical technique the incisions were usually multiple, short, and anterolateral over the proximal and middle closed spaces in the fingers, and a single midline incision was made over the sheath in the palm. The bursa about the wrist were drained as advocated by Kanavel, by lateral incisions. The average period from operation to complete healing was 53 days. It was nearly twice as long in the cases with tendon necrosis as in those without.

Localized tenosynovitis occurred in 24 cases, most commonly in the first and fifth fingers. In all but 6 of these 24 cases the infection was definitely of the secondary type and was probably caused by adhesions within the sheath developing in the presence of a slowly invading infection from without. The results in these cases were better than average.

In 28 cases the tendon sheaths were not completely drained, and in 17 a later operation was required. The most common error was failure to drain the palmar portion of the tendon sheath in infections of the second, third, and fourth fingers. The end results in these 28 cases were poorer than the average.

Contamination at operation of uninfected portions of the sheath did not alter the results very appreciably. When doubt exists as to whether the infection is limited to a part of the sheath, it is far better to incise the whole sheath even if it may prove to have been unnecessary. Also in doubtful cases of tenosynovitis it is much wiser to operate than delay.

Delay before operation is probably the most important cause of poor results. Other causes are secondary infections, the late removal of drains, incomplete drainage of the tendon sheath, improperly placed incisions, and delay in starting active motion of the fingers.

The author had 7 cases of gonococcus tenosynovitis, all with hematogenous infections. None of the cases developed tendon necrosis or any other complications, and the results obtained were unusually good.

HARVEY S. ALLEN, M.D.

Buchman, J. *Platyspondyly*. *Arch. Surg.*, 1937, 34.

23

Platyspondyly is a congenital anomaly consisting essentially of a widening of the vertebral body. The condition was first described by Putti in 1910.

For a clear understanding of this maldevelopment it is necessary to consider the embryology of the spine in its membranous, cartilaginous, and osseous stages. Its genesis may be attributed to a failure or a delay in the fusion of the lateral halves of the vertebral anlagen at the membranous stage of embryonic development. Thus a failure of fusion of the posterior arches causes spina bifida, and a failure of fusion of the vertebral bodies causes somatoschisis, while a delay of fusion causes the widening of the vertebral bodies with a characteristic appearance to be described later. With this developmental basis for his theory, Lance was enabled to classify this anomaly into several types as follows:

Type 1. In this type there is a widened vertebra, with thickened, adjacent vertebral discs and spina bifida. This form is localized and usually involves the fourth and fifth lumbar vertebrae.

Type 2. In this type there is a widened vertebral body which is divided into two cuneiform segments, with their apices placed centrally and their bases laterally. This anomaly may or may not be associated with spina bifida. The spina bifida and somatoschisis are rarely limited to one segment and are associated with a number of anomalies, regional differentiation, and fusions of the vertebrae. Platyspondyly of this type is most common in the thoracic and cervicothoracic regions. In such cases the shape of the intervertebral discs is the counterpart of the shape of the vertebrae.

Type 3. In this type the superior and inferior surfaces of the vertebral bodies are concave in the center, as seen in the anteroposterior views, while the intervertebral discs are convex and proportionally higher than normal. Such an anomaly may be limited to several vertebra or may involve the entire spine.

The author has compiled a table of normal ratios of the transverse diameters to the vertical diameters of the various vertebrae. Measurements were taken of roentgenograms of normal spines at various ages. One hundred and forty-five roentgenographic films of whole or partial spines in anteroposterior and lateral views were measured. The spines were divided into 6 age groups—from birth to one year of age, from one to six years, from six to eleven, from eleven to sixteen, from sixteen to twenty-two, and from twenty-two years up.

An increase in ratio over the normal is indicative of platyspondyly.

The author presents 38 cases which illustrate each of the 3 types of platyspondyly.

#### DIFFERENTIAL DIAGNOSIS

The most common of the lesions from which platyspondyly has to be differentiated are Pott's disease, compression fractures of the spine, malignant disease, vertebral epiphysitis, vertebral osteochondritis, osteoporosis, microspandy, fetal chondrodystrophy, and herniations of the nuclei pulposi.

**Pott's Disease.** The usual case of Pott's disease will offer no difficulties in diagnosis because of the disability, the localized pain and deformity, and the roentgenographic picture of rarefaction, destruction, collapse, loss of intervertebral discs, and abscess formation. However, occasionally a case may be seen in which there is compression but no other evidence of tuberculous disease. In such an instance the vertebral body will show wedging but rarely widening in the anteroposterior roentgenogram. Moreover, there will be roentgen evidence of destructive disease. The clinical history, the physical findings, the roentgenographic appearances, and the absence of other congenital anomalies should establish the diagnosis.

**Compression Fractures.** In cases of traumatic compression there is always a definite history of injury, even though slight, followed by localized pain and disability with associated physical findings of localized tenderness, muscle spasm and rigidity. The location of the lesion is usually in the thoracolumbar region while in platyspondyly it is most commonly in the thoracic and cervicothoracic regions. Traumatic compression usually occurs in later life. Roentgenographically there are no associated congenital anomalies. The compression results in wedging with the apex anteriorly, and the base posteriorly as seen in the lateral views while in platyspondyly the flattening involves the entire body, and the lateral views do not present wedge formation.

**Malignant Lesions.** In cases of primary and metastatic disease of the spine the subject is usually an adult, often past middle age, with a history of intense localized pain and loss of weight and frequently showing cachexia. The pain is so severe that it is controlled only by large doses of sedatives. The primary focus is often evident. Local areas with marked tenderness to pressure are found in the

spine. Rigidity and muscle spasm are present, and in the late stages an angular deformity results. The roentgenograms show an absence of the changes noted in platyspondyly, and in contrast reveal mottling of the vertebra in the early stages, and destruction and collapse of one or more vertebrae with resultant angulation in the late period.

**Vertebral Epiphysitis.** This lesion rarely occurs before the second decade. There is usually a history of an abnormal tendency toward fatigue, intermittent pains, and increasingly poor posture during the second period of rapid growth. Clinically there may be tenderness over the spinous processes and the iliac crests, and occasionally over other rapidly developing osseous centers. Gross deformities of the spine occur. Roentgenographically there are irregularities in ossification in the form of areas of condensation and rarefaction of the vertebral bodies, and irregular superior and inferior outlines of the vertebral segments.

**Vertebral Osteochondritis.** Vertebral osteochondritis develops during the first period of rapid growth of the spinal column—the first few years of life. The history reveals pain and increasing deformity. Clinically there may be indications of tenderness along the spine. Localized deformity may be present. Roentgenographically irregularities in ossification and the vertebral outlines of one or several vertebrae may be seen. There may be wedging of the vertebral segments, but neither widening in the transverse diameters nor the formation of concavities on the superior and inferior vertebral surfaces characteristic of platyspondyly occurs.

**Osteoporosis.** The rare forms of hunger, traumatic or senile osteoporosis of the spine, may present flattening of the vertebrae but never widening. The bony texture of the bodies is porous, while in platyspondyly it is always normal. Furthermore the absence of other congenital anomalies, the history of the onset, the symptoms, and the physical findings will establish the diagnosis.

**Microspandy.** Microspandy presents an aplasia of the entire vertebra. The vertical diameter as well as the transverse and sagittal diameters are lessened.

**Fetal Chondrodystrophy.** In this condition there is a widening of the vertebral bodies associated with distinguishing irregularities in outline and ossification. The intervertebral discs are not disproportionately enlarged nor do the vertebrae present the characteristic concavities, spina bifida or scoliosis.

**Herniation of the Nucleus Pulposus.** This pathological condition is most evident in the lateral views of the spine, although occasionally it can be demonstrated clearly in the anteroposterior aspects. Reactive processes on the part of the bone in the form of rarefaction or increased calcification around the herniations are usually present. Herniation of the nucleus pulposus is not a clinical entity and for this reason is always a part of some other disturbance such as osteoporosis of the spine, Kummell's

disease, fractures, malignant disease, or osteochondroplasia

NORMAN C. BULLOCK, M.D.

Villemin, F. and Simeon, A. The Structure of the Upper End of the Femur in Man (*L'architecture de l'extrémité supérieure du fémur chez l'homme*) *Rev. d'orthop.*, 1937, 24, 5

Villemin and Simeon report a study of the structure of the upper end of the femur in man and the changes characteristic of old age which was made on 100 femurs from adults of both sexes ranging in age from eighteen to eighty-one years. The bones were sectioned in different planes, and some of the specimens were studied roentgenographically.

From their findings the authors conclude that the upper end of the femur consists essentially of a compact cortex, 3 large bundles of bone lamellae originating in this cortex (the cephalic, the trochanteric, and the arciform bundles), and a lamella of bone, largely compact bone, which is a prolongation of the posterior wall of the diaphysis below the lesser trochanter—Rodet's lamella. The arciform bundle is curved and crosses the 2 other bundles—the cephalic and the trochanteric. At these points the spongy tissue is more resistant, especially in the region of the cephalic bundle. Except for these 3 bundles of lamellar bone and the single lamella of Rodet, the bony lamellae of the upper end of the femur are more fragile and less clearly orientated, they constitute weak points in the structure of the femur. There are thus 2 weak points in the epiphysis, one above the termination of the cephalic bundle, and the other between this bundle and the arciform bundle below the point of attachment of the ligamentum teres.

In the neck of the femur and in the upper end of the diaphysis there are 3 zones of diminished resistance, the first, between the arciform bundle and the point of origin of the cephalic bundle, the second, and most important in extent, in the anatomical neck of the femur, in the form of a triangle with its base the arciform bundle, and the third extending below the arciform and trochanteric bundles.

In most aged persons, rarefaction of the bone (osteoporosis) occurs. It involves chiefly the zone of least resistance between the principal bundles of lamellar bone. Therefore, the weaker points of the structural system are the chief sites of the osteoporotic changes. The spongy bone of the trochanters, especially the greater trochanter, also shows some rarefaction.

As the triangular zone in the neck of the femur is an area of diminished resistance, cervical fractures occur there most frequently in the adult. As in the changes characteristic of age, the rarefaction of bone involves especially the region in the base of the femoral neck and between the trochanters, the typical fracture of old age is a cervicotrochanteric fracture. The age of the patient does not always determine the degree of rarefaction. There is a considerable individual variation, a person forty-five years of age may show more advanced changes

than a person of seventy-five years. However, the degree of rarefaction will to a great extent determine the site and extent of the fracture.

In conclusion the authors state that their observations are well supported by the clinical statistics of Delbet and Basset.

ALICE M. MEYERS

## SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Huard, P. and Roques, P. Three Disarticulations in the Posterior Part of the Foot—Ricard, Subastragalus and Syme (Trois désarticulations de l'arrière pied—Ricard, sous astragaliennet et Syme) *Rev. de Chir.*, Par., 1936, 55, 707

Ricard's amputation consists in disarticulation of the entire foot, including the astragalus, but excepting the calcaneus which is left in contact with the lower end of the tibia. Some writers ascribe priority of this amputation to Jahoulay, and it may therefore be called the Jahoulay-Ricard operation. It has steadily gained in popularity in France in preference to Pirogoff's amputation. It is indicated in cases where the pathological change demands a posterior amputation and also when a previous Chopart procedure has not been successful.

In the technique a skin incision is made conserving as much of the sole of the foot as possible, after which that part of the foot in front of the calcaneus is disarticulated. The astragalus is then removed. It is often necessary to remodel the calcaneus before the soft parts can be sutured over it. If the external malleolus is too prominent, it should be trimmed down on its inner surface. The calcaneus is then forced in between the malleoli, not in its normal axis but a little farther forward than the normal position, thus diminishing the leverage of the Achilles tendon which otherwise might cause an equinus deformity. The mechanical principle is the same as in astragalectomy: the malleoli must be set farther back than normal.

The results, both anatomical and functional, are good in a large majority of the cases. Poor results may arise from the development of an equinus or varus deformity. The authors report 8 cases. In 4 of these, good results were obtained, in 2, there was moderate success, and in 2, failure. In 1 of the cases with failure an amputation of the leg was decided upon, in the other, an artificial foot was applied with the weight partly on the stump and partly on the tibial condyles, indirectly through the artificial foot.

Subastragaloid disarticulation is the best amputation in the posterior part of the foot when the calcaneus cannot be saved, and the ankle joint is intact. The best approach is a racket incision with the handle external. Parts of the calcaneus may be used to build up the inferior surface of the astragalus. Section of the Achilles tendon is necessary. The flexor tendons should be sutured in the sole to prevent equinus deformity. This amputation was introduced by Malgaigne in 1846 and has remained a



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A technique using 55 kv, 3 ma of tube current, 2 mm of aluminum as filter, 16 in tube target table top distance, and a table of 3/4 in pine veneer may not be ideal, but, with modifications according to clinical expediency, may be worthy of trial.

It is suggested that the fluoroscopic apparatus be equipped with readily changeable filters, and allow mechanical manipulation of the fractures, as suggested by Hawley, in place of manual reduction.

Since the effects of roentgen irradiation are cumulative and evidence of injury may develop late, it is recommended that each operator keep a permanent record of the radiation he has received on his hands from all roentgenological examinations. As an additional safety factor, the operator should calculate his maximal possible exposure and consider that he has received this dose even though additional protective factors may have been employed.

It is suggested that the various committees on roentgen ray protection make their recommendations from a clinical as well as physical point of view which they have not done to date.

Masmontell, F. Sudden Death In Fractures (Mort subite dans les fractures) *Bull et mém Soc d chirurgiens de Par*, 1936, 28 523

The author is of the opinion that, although rare, sudden death following a fracture occurs often enough to deserve investigation. He has observed 14 of such cases himself, has found 15 in the literature, and has been told of 23. He believes that the reason he has seen so many is because of his unusual interest in traumatic fractures. In his personal cases 8 were fractures of the neck of the femur, 1 a fracture of the femoral shaft, 1 of the humerus, 1 of the forearm, 1 of the ankle, 1 a compound fracture of the leg, and 1 a fracture of the upper extremity of the tibia. Most of the deaths occurred between the eighth and twentieth days, though 2 occurred on the fourth day. Usually they occurred when the patient was waking in the morning, or making some movement, for instance, when the plaster was changed. Most of the patients presented the picture of embolus.

The author discusses the pathogenesis at some length and says that though accidents like rupture of an aneurysm may occur occasionally, he believes that in the majority of instances the most obvious cause of the death is embolism. He believes that this is true in cases of fractures because of the damage to the soft parts and because of the immobilization of the extremity. The embolus in these cases is probably not of infectious origin. He presents 2 cases with complete autopsy reports and discusses others in which the autopsy was negative. He suggests that in the latter instances minute emboli might have been present and caused a reflex death similar to that occasionally noted when a needle is inserted into the pleura. He believes that the existence of fat emboli needs further investigation. It is possible that in certain cases anaphylactic

phenomena may be the cause of death. He believes that preventioo is difficult because frequently the embolus is the first sign of the trouble. Increased coagulability of the blood is not a sufficiently constant sign to act as a warning.

BARBARA B. STIMSON, M.D.

D'Aubigné, R. M. Bony Union In Fractures of the True Neck of the Femur. A Report of 20 Cases which were Followed Up after Extra-Articular Nailing (De la consolidation osseuse dans les fractures cervicales vraies du col du femur. D'après vingt cas suivis après enclouage extra articulaire) *J de chir*, 1936, 48 630

The author says that with the old methods of closed reduction and the application of plaster casts fractures of the neck of the femur showed bony union only in about 50 per cent of the cases. Frequently the method was not applicable because of the age or condition of the patient. Various open methods have been attempted and with the introduction of the Smith Petersen pin these have proved increasingly satisfactory. The author states that a modification of Johansson's method gives extremely satisfactory results. The modification permits the use of this method in all cases regardless of age, and avoids the dangers of arthroscopy. Of 39 consecutive cases of fractures of the neck of the femur, the author was able to apply this method in 36. Three patients could not be treated because of insanity, hemiplegia, and tuberculosis of the trochanteric region. Twenty nine of the patients were over sixty years of age, and 8 were over seventy. There was 1 death from embolus fifteen days after operation. In the remainder of the cases the post-operative course was smooth. Twenty of the cases were followed up for periods varying from four months to two years and all of them showed bony union when examined with the x ray.

The author calls attention to the fact that after nailing, decalcification of the head and of the distal fragment are always parallel, which is in contrast to the density of the head in the cases treated by closed reduction and the application of plaster. He feels that the factors governing bony union are, primarily, adequate reduction and complete immobilization.

The second part of the article is a discussion of his technique. The procedure is divided into 2 parts. The first is done with the patient under morphine or some other form of anesthesia. It consists of reduction and the insertion of a wire, the results are checked with the x rays. The second part is done with the patient under general or local anesthesia. It consists of the insertion of the Smith-Petersen nail over the wire with surgical precautions.

The author presents diagrams and roentgenograms to illustrate his technique.

Following the procedure the limb is kept in extension for the first week. The patient is kept in bed without apparatus until the thirtieth day. He is allowed to walk with crutches without weight on

the injured leg at the end of the first month, and at the end of the third month he is allowed to walk with canes

BARBARA B STANSON, M.D.

**Lundgren A. The Healing Results of Fractures of the Tibial Shaft (Über die Heilungsergebnisse der Interchenkelknochenfrakturen). *Acta chirurg Scand* 1930 8 Supp 42**

The author presents a detailed study of 369 cases of fracture of the tibial shaft, each of which was an insurance case and was treated in one of five large hospitals between 1918 and 1929. He is able to correlate the hospital records and insurance data and believes this correlation is of utmost importance in evaluating any such series. He gives first a detailed historical survey with a summary of the literature and an analysis in tabular form of the series of cases published by other authors. He then analyzes his own series and compares his findings with others previously reported. The average age of his patients was 38.6 years. By far the greatest number were men. Three hundred and two patients presented closed or uncomplicated fractures and 67 compound fractures. The fractures could be divided into 5 groups: transverse (111), oblique and spiral (183), comminuted (88), double (3), and refractures (2). About 60 per cent were in the lower third of the tibia or at the junction of the middle and lower thirds.

The treatment varied considerably in the different hospitals. Seventy-three of the closed cases did not require reduction. Of those in which reduction was necessary, 172 were treated by closed methods and 58 by operation. The closed method which was used most frequently was reduction followed by immobilization in plaster. A certain number were treated by extension with pin and wire and in the last years Boehler's method of extension and the unpadded plaster cast came into use. Operative treatment by various methods increased in frequency in the latter part of the period. In compound fractures immediate debridement was followed by closure of the skin in 73 cases. Tables are presented which show the duration of the hospital stay and the period of disability and duration of the insurance payments. The average disability time was seven months, five and one half months for uncomplicated, and eleven and one half months for compound fractures. Shortening, angulation and loss of motion in the ankle joint are among the causes for permanent disability.

After analyzing the cases the author answers certain much debated questions on the basis of his findings. Detailed tables are presented in every instance. The first question is that of the influence of the anatomical position in the end result. The author concludes that an exact anatomical position is no absolutely essential, but for optimum results the best possible reduction by all methods should be obtained. The relation of the type of fracture to healing is next analyzed and in this series the healing time of the oblique and spiral

group was shorter than that of the transverse. The comminuted group was lower in healing than either of the others.

The results following different methods of treatment are presented. The group treated by cast or in plaster or splints without reduction obviously presented excellent results and should not be included in the comparative statistics as the original injuries were simpler. In transverse fractures treatment by reduction and plaster or by traction suspension, and by operation produced about the same results. In spiral and oblique cases the operative treatment seemed to give a somewhat more favorable outcome. Of the different operative methods, fixation with screws appeared to be the most satisfactory method. Comminuted fractures in this series were usually treated by reduction and plaster. Two cases received extension treatment and one operative so no comparison can be made.

The author believes that the risk of infection should not keep the surgeon from operating when operation is indicated, but the danger should always be kept in mind and eliminated as far as possible by meticulous asepsis and technique. Delayed healing or non union is not to be feared particularly as a result of operative methods. Skilled surgeons are essential not only for operative but also for closed methods, especially for the Boehler type of treatment. Operation is indicated in fractures of the spiral and oblique type especially in the lower third of the tibial shaft, as a primary procedure in spiral and oblique fractures anywhere in the shaft if closed reduction is unsatisfactory and in transverse fractures if satisfactory position cannot be obtained by closed reduction. Comminuted fractures present a difficult operative problem. From his data the author concludes that operation should be done as soon as the primary shock is over and before lun changes appear. Compound fractures are best treated by debridement, excision of the wound with primary closure and reduction without immobilization.

BARBARA B STANSON, M.D.

**Walheim T and Ahlman N. Intra articular Malleolar Fractures. *Acta chirurg Scand* 1930 79 165**

The author presents a study of ankle fractures from the Military Hospital in Stockholm during the period from 1922 to 1932.

One hundred twenty-seven cases of intra articular malleolar fractures were examined and divided into 2 groups: (1) those treated by manual non-operative reduction and (2) those treated by operative reduction. The most recent fractures occurred a least two years before this report was made. Thirty-seven cases were operated on at immediately or admission. At operation the fractures were reduced and maintained in position by round steel pins and in some places by cerclage with wire. Following the operation a plaster cast was applied. The patient was kept in bed until the swelling disappeared, after which he was allowed up in a walking iron. All of

the intra articular fractures, whether operated on or not, were treated in the hospital. The author believes this is of great importance in the outcome of the case. In operative cases interposition was found in 26 of the 37 cases. One case in this series showed infection in the suture line. There were no other instances of infection.

The author presents tables, showing periods of immobilization and disability, and a classification of the cases according to Ashhurst. In a recent follow up study it was found that cases treated by operation showed consistently better results than those not operated on. It was found also that the fractures involving the articular weight bearing

surface of the tibia showed a greater tendency to develop arthritis deformans than fractures of the lateral supporting surfaces. Therefore, a longer period of fixation is recommended for the former.

The author also presents a study of 245 cases of non operative intra articular malleolar fractures from the Government Insurance Bureau for the year 1931. The results were not as good as those of the previous series, and the author concludes that the indications for operation in intra articular malleolar fractures should be extended.

The article is illustrated with roentgenograms, and followed by a bibliography.

BARBARA B. STIMSON, M.D.

# SURGERY OF THE BLOOD AND LYMPH SYSTEMS

## BLOOD VESSELS

Landis, E. M. The Passage of Fluid Through the Capillary Wall. *Am J M Sc* 1937 193 397

The author discusses a few of the known factors which influence the movement of fluid inward and outward through the capillary wall. He states that a normal fluid balance is not a simple balance but a complicated equilibrium resulting from the interplay of numerous forces. The pathogenesis of edema is even more complex because the gross accumulation of fluid depends, in addition upon the water intake, the available sodium chloride, and the renal excretion of water.

The factors concerned in the pathogenesis of edema are classified as primary and contributory. The primary factors are fundamental since each is able to produce clinical edema unaided by other forces. Ordinarily the contributory factors do not themselves produce edema but modify the severity or distribution of edema produced by one of the primary causes.

TABLE 1.—FACTORS IN THE PATHOGENESIS OF EDEMA

Factor favoring edema formation	Clinical examples
<b>A. Primary</b>	
1. Elevated capillary pressure	1. (a) External pressure on veins (b) Thrombophlebitis (c) Cardiac edema with venous congestion
2. Lowered colloid osmotic pressure	2. (a) Nutritional edema (b) Nephrotic edema (c) Cardiac edema late stages with malnutrition
3. Damage to capillary wall	3. (a) Inflammatory edema (b) Nephritic edema (c) Cardiac edema (?) chronic anoxemia
4. Lymphatic obstruction	4. (a) Lymphedema (b) Cardiac edema with venous congestion
<b>B. Contributory</b>	
5. Low tissue pressure	5. Edema of periorbital tissues and genitalia
6. High salt intake	6. Increases edema if water is available
7. High fluid intake	7. Increases edema if salt is available
8. Warm environment	8. (a) Heat edema (b) Increases all types of edema
9. Disturbed innervation	9. (a) Trophedema (b) Unilateral edema in hemiplegia

The author notes that the effects of elevated capillary pressure are seen when venous congestion is produced for example by a tight bandage or by thrombophlebitis. Low colloid osmotic pressure of the blood is primarily responsible for the edema of prolonged protein starvation and for nephrotic

edema. After gross injury, the permeability of the capillary wall increases 7 fold. The plasma proteins pass easily and the protein content of the plasma fluid ranges from 1 to 6 per cent. This factor is the important one in the edema following burn, chemical injury or severe infection. The impairment of lymph drainage due to congenital hypoplasia of lymph vessels, external pressure or recurring lymphangitis is responsible for many unilateral collections of fluid. The edema of cardiac decompensation has been ascribed in part to obstruction of the lymph flow because the larger vessels must empty their contents into congested veins.

Among the factors contributing to the development of edema is looseness of the tissues, which favors the early appearance of edema in certain sites, where it may be recognized before being detectable elsewhere, as, for example, in the periorbital tissues.

When one of the primary factors favoring edema is present a high salt intake leads to retention of fluid, making latent edema obvious or mild edema more severe. If the salt intake is restricted, the fluid cannot be retained and mild edema is more or less reduced. The reduction of edema resulting from restriction of the intake of sodium chloride has been advanced as evidence against the Starling theory of edema. However it would seem more logical to consider the altered fluid balance during salt restriction as an artificial equilibrium—essentially a form of dehydration—which temporarily masks the underlying tendency toward edema formation. Certainly relaxation of vigilance as to diet is followed by return of the edema unless the underlying primary cause has been corrected. Moreover, sodium chloride restriction does not usually relieve edema due to pronounced venous congestion or a very low colloid osmotic pressure.

Heat produces peripheral vasodilatation, raises the capillary blood pressure and increases the area of capillary wall available for filtration. Environmental temperature influences the volume of the extremities. Normal individuals develop dependent edema when they are first exposed to the continued heat of the tropics.

A disturbed innervation rarely produces edema unless a primary factor is also operating to some degree. In patients with a cardiac condition and latent or mild edema, hemiplegia is followed at times by edema of the paralyzed extremity. More over disturbances of innervation often produce temporary or permanent vasodilatation which favors filtration.

Although investigation since the time of Harvey seems to have penetrated well into the capillary walls our knowledge concerning the nature of the capillary endothelium is still fragmentary. In all probability continued research will demonstrate that

the fluid balance is affected by additional, as yet unknown, forces

HERBERT F. THURSTON, M.D.

**Loehr, W.** Intermittent Claudication of the Upper Extremity—Acute Venous Congestion Operative Treatment and Its Results (Die Claudication intermittens der oberen Extremität—akute Venenstauung Ihre operative Behandlung und ihre Heilergebnisse) *Arch f klin Chir*, 1936, 196 596

The author first cites the theory advanced by him in 1933 that, in addition to the rare thrombosis of the large axillary veins resulting from effort, there is a much more frequent similar clinical picture—that of acute venous congestion of the axillary or subclavian veins. He states that these conditions can be differentiated from each other clinically only with great difficulty. In the first stage a severe arm strain is followed by sudden acute weakness with pain. In the second, the signs are swelling of the arm, cyanosis, numbness, paresthesia, and difficulty in moving the arm. The third stage is characterized by the development of a visible collateral network of veins over the shoulder and chest. This stage may last for weeks, until the obstructed blood is released. Gradual improvement follows, but recurrence develops under the strain of effort.

The anatomical basis of this venographically demonstrated picture is chiefly a mechanical obstruction to venous outflow (glands, fascial cords across the subclavian vein like the Langerhans bands).

To determine the end results of operative and non operative treatment, the author followed up patients whose cases he reported several years ago. He found that those who were operated upon were cured, whereas those who were treated conservatively—some of them as long as eight years previously—had not regained complete function. In the latter, swelling of the arm, slight fatigability, and a visible collateral venous network were still present.

In conclusion Loehr says that, on the basis of the clinical course, he believes that in some of the cases reported in the literature as cases of thrombosis of the arm due to effort the condition was in reality intermittent claudication. In agreement with Wulsten, Lundgren, and Kuntzen, who also found venous stasis in intermittent claudication, he recommends operative treatment of the latter condition.

(LOEHR) PHILIP SHAPIRO, M.D.

## BLOOD, TRANSFUSION

**Schliodt, E.** Observations on Blood Regeneration in Man. I The Rise in Erythrocytes in Patients with Hematemesis or Melena from Peptic Ulcer *Am J W Sc* 1937, 193 313

In a study of patients with hematemesis or melena from peptic ulcer the author found that the rise in the erythrocytes was much faster when, from the day of their admission to the hospital, the patients were given a full puree diet and an iron medicament as in the Meulengracht treatment.

Blood counts were made in the cases of 50 patients with a history of either hematemesis or melena due to peptic ulcer, all of whom had been given a full puree diet from the day of their admission to the hospital. Cases with complications were excluded from the study. Blood for examination was taken about once a week, and curves were plotted for the erythrocyte regeneration. The individual curves seemed remarkably straight. Starting from different levels, they tended to meet at the level of 4.54 millions of erythrocytes thirty three days after the lowest erythrocyte count was found.

This finding conforms to a theory of regeneration based upon the assumption of the maintenance of a normal blood exchange rate, which can be expressed by the following equation: average daily rise  $\times$  longevity of erythrocytes = normal value—lowest value.

This theory is discussed by the author at some length. In the patients he studied there was a slight check on blood regeneration which may be explained by the assumption of a 15 per cent diminution in the production rate.

The longevity of the erythrocytes found in this study, thirty three days, is well in accord with the findings of other methods. Besides giving an idea of the mechanism of regeneration, the author provides a sample equation which may be used as a standard for estimating the rise in individual cases.

HERBERT F. THURSTON, M.D.

**Schliodt, E.** Observations on Blood Regeneration in Man. II The Influence of Sex, Age, Form of Hemorrhage, Treatment, and Complications on Erythrocyte Regeneration After Hematemesis and Melena from Peptic Ulcer *Am J W Sc* 1937, 193 327

In an earlier communication the author reported findings which indicated that the daily rise in erythrocytes in patients with hematemesis or melena from peptic ulcer is dependent upon the degree of anemia. He found that the equation he suggested might be used as a standard when factors such as age and sex are to be considered.

In this article he reports an investigation of the influence of sex, age, form of hemorrhage, treatment, and complications on erythrocyte regeneration. Of the 34 patients studied, 9 were women and 25 were men. Sex and age were found to make no difference in the regeneration rate. From curves presented it is seen that the patients between twenty and forty years of age did not regenerate their blood any better than patients between forty and sixty years of age. Seventeen of the 34 patients had had melena alone, and 17, both hematemesis and melena. As, in melena, there is the theoretical possibility that some of the blood lost may be regained by absorption in its passage down the intestinal tract, better regeneration might perhaps be expected in patients who have had melena alone. However, it was found that the manner of bleeding is of no importance.

In 11 cases in which iron was not given there was no apparent retardation of the regeneration. The Meisengracht treatment for bleeding ulcer was found superior to the fasting treatment. In the former a full puree diet and an iron medicament are given simultaneously. In the cases of patients on the puree diet the longest time before the blood count began to rise was seventeen days. In the others the fall in the count continued for a considerable length of time—sometimes until the puree diet was given.

In the 5 cases in which a blood transfusion was administered the transfusion did not show any definite efficiency in promoting regeneration. Theoretically transfusions should not be expected to exert an influence on the rate of regeneration. When the lowest blood value is increased by a transfusion the regeneration starts from a higher level. However the regeneration is no more speedy as the transfused blood does not live any longer than the patient's blood.

In 10 patients who had melena or hematemesis from causes other than peptic ulcer there was a definite failure to reach standard values. In 4 patients who had hemorrhage from a peptic ulcer and suffered also from a complicating condition such as phlebitis, achylia with tertiary lues, undulant fever, or cholelithiasis there was a definite lag in regeneration. The author therefore concludes that complications have a retarding influence on blood regeneration.

HERBERT F. TELLER, M.D.

#### LYMPH GLANDS AND LYMPHATIC VESSELS

Ebbehoj, A. Lymphogranulomatosis (Ueber Lymphogranulomatose). *Hosp Tid* 1936 p. 253.

The author discusses the etiology, clinical manifestations, prognosis, and therapy of lymphogranulomatosis (Hodgkin's disease) in detail. This disease was formerly thought to be a neoplasm but now the majority believe it to be the result of infection. Many believe it to be of tuberculous origin because of the many clinical similarities between it and tuberculosis. The negative result of the Piquet reaction in lymphogranulomatosis disproves tuberculous infection. In addition it is not frequently found in families in which tuberculosis occurs. The virus origin is being considered more and more important. The author has seen 55 cases of lymphogranulomatosis within five years. They were about evenly divided between the sexes and occurred between the ages of three and seventy-six years. The greatest incidence of the disease was found between the ages of twenty and thirty years and a slightly lower one between the ages of forty and fifty years.

In some of the patients only the superficial lymph node enlargements which they themselves have discovered may be found at first. However, by means of the roentgen rays mediastinal tumors of considerable size are often found, which at times produce serious clinical manifestations (dyspnea, cough, cyanosis). Since lymphogranulomatosis is often results in the formation of cavities and miliary tuberculosis like changes, errors in diagnosis are easily occur. This is true, especially when the first localization is found to be in the gastro-intestinal tract as in these cases characteristic findings are rare and the correct diagnosis is usually first made at operation or autopsy. Enlargements of the liver and spleen are rarely found to be the earliest symptoms of lymphogranulomatosis. The author saw 1 case with vertebral manifestations and symptoms of compression of the medulla and nerve roots in the form of paraplegias and pains in the arms and legs. Roentgen treatment was followed by rapid and complete cure. Similar results were obtained in a case of lymphogranulomatosis of the cervical vertebrae and ribs.

The author considers the pink color which shows through the skin and the very red cheeks, so often seen in patients with lymphogranulomatosis as a bad external prognostic sign. No importance is attributed to the blood findings as an aid in diagnosis. Pronounced leucocytosis is seen in only a few cases. Of 32 untreated patients 22 had a leucocyte count ranging between 5,000 and 10,000, 11 between 10,000 and 20,000, and only 3, between 20,000 and 30,000. Lymphopenia is a more constant symptom but it may be absent at the onset of the disease. Monocytosis is found more often than leucocytosis while eosinophilia is comparatively rare. The hemoglobin levels and erythrocyte counts may remain normal for a long time. Sedimentation is accelerated gradually in the later stages but may return to normal during remissions or following treatment. In the rapidly progressing cases new lymph nodes and organs are constantly involved. The prognosis in these cases is always bad and the outcome is fatal in the course of from one half to two years in spite of transitory improvement following treatment. The rapidly progressive cases comprise about one fifth of all the cases. In about one half of all the cases there is a tendency toward localization with prolonged maintenance of general well being, and only rare recurrence. In these cases roentgen ray treatment gives especially good results and may prolong life for from three to ten years. All cases however, eventually terminate in death but in many appropriate treatment will permit the patient to continue with his work for a period of years.

(HAGEN) LEO M. ZIMMERMAN, M.D.

# SURGICAL TECHNIQUE

## OPERATIVE SURGERY AND TECHNIQUE, POSTOPERATIVE TREATMENT

Riese, J. Silence During Operation and Its Importance in Relation to Other Factors of Asepsis (Stummes Operieren und seine Bedeutung im Vergleich zu anderen Faktoren des Aseptik) *Zentralbl. f. Chir.*, 1936, pp. 1874, 1922

Suppurations still occur after clean operations. Their incidence ranges from 0.6 to 30 per cent and averages 7.4 per cent. In the author's hospital, in the period from 1918 to 1925, wound suppuration occurred after 27 per cent of 817 "clean" operations. Demmer then introduced his glove disinfection method (sterilization with sublimate instead of steam). By this method, the boiling of instruments for fifteen instead of ten minutes, and more rapid and gentle operating, the incidence of suppuration after 641 clean operations was reduced to 5 per cent. The author states that in his own cases the incidence of postoperative suppuration was at first 4.2 per cent, but when he stopped doing ligations in the superficial layers of the wound, which he believes are responsible for some of the most severe operative injuries to the tissues, it fell to 0.7 per cent in a yearly average of 700 clean operations. The fact that, in spite of all the improvements in asepsis, postoperative suppuration is not always prevented, he attributes to neglect of saliva droplet infection. The danger to operative wounds of droplets of saliva has already been pointed out by Koch, Fluegge, Huebner, Mendes De Leon, Davis, Eliason and Laughlin, Gundel, Meleney and Stevens, Rouffart, and Walcker. Silence on the part of the operating room personnel was demanded by Brunner and Mikulicz.

*The physics of saliva droplet infection.* Except in quiet expiration, droplets of saliva are expelled during speech of any sort. Whispering is particularly dangerous because of the sharper propulsion of the breath in the pronunciation of the consonants. Experiments carried out by the author have demonstrated that with sharp enunciation of double consonants, as in the pronunciation of the word "Klemme," there is an emission of droplets with a diameter of from 1 to 2 mm. The droplets travel for distances ranging from 50 cm to 4 mm. Leon and the author found that the average number traveling a distance of 30 cm (the average distance between the surgeon's mouth and the operative wound) is one droplet per word and per square centimeter. The scattering angle is about 60 degrees in the sagittal direction and about 80 degrees in the transverse direction. Very small drops may remain in the air for a while and descend anywhere on instruments, aprons, or swabs. As it is possible that severe infections may be caused by droplets of saliva during subcutaneous injections, silence is indicated also in these procedures. To determine how many words

are spoken during an operation, Riese counted the words spoken during appendectomies. When orders were given in the briefest manner, the number was 40, when they were given without special attempt at brevity, it was 300, and when orders, uncurtailed instruction, and chatting occurred during the suture of the abdominal wall, as is usual, it was 1,000. During closure of the abdomen talking is particularly dangerous as at this stage of the operation most of the compresses are removed, and the subcutaneous fat, the most easily infected of all layers, lies freely exposed and wholly without protection against the rain of droplets. Least of all is this the time when speech should be allowed.

*The bacteriology of saliva droplet infection.* The bactericidal power of the saliva is conditional. In healthy persons the saliva is bactericidal always to the bacillus prodigiosus, but not always to the bacillus coli and only irregularly to streptococci. The fact that wounds in the mouth usually heal remarkably well is not necessarily indicative of bactericidal power of the saliva. It is equally evidence of an immunity of the mucous membrane of the mouth. The author calls attention to the poor healing of wounds made by biting. In injury due to a bite, saliva containing pus-producing organisms is inoculated into a contused wound. To such a wound Riese compares the tissue wound made with an artery clamp into which a droplet infection has been introduced. Von Grabner found that healthy animals inoculated with the sordes of healthy human beings died of general infection. Of a series of animals which he inoculated with the saliva of 111 healthy human beings, 27 died of peritonitis and almost all developed inflammation at the site of the inoculation. Biondi, Mieczkowski, and De Leon found virulent staphylococci and streptococci in saliva. Thin saliva is more dangerous than thick saliva. De Leon found that one drop with a diameter of 1 mm. contained 66,250 organisms, half of which were pathogenic. Meleney and Stevens found hemolytic streptococci in 53 per cent of the personnel of an operating room. Aschoff also emphasized the preponderance of streptococci in the flora of the mouth. In the upper respiratory passages of healthy human beings diphtheria bacilli are frequently present. This fact may explain cases of wound diphtheria.

In experiments performed by the author in which pieces of subcutaneous fat freshly removed from operative wounds were exposed at a distance of from 15 to 20 cm. to droplets of saliva expelled in speech for four minutes through the protection of a mask, it was found that 82.6 per cent of the specimens showed infection and 53.6 per cent were infected with pathogenic organisms (chiefly streptococci but also staphylococci, pneumococci, and colon bacilli). To meet the objection that the dust of the operating room might



have played a rôle in this infection Riese made further experiments. Melency and Stevens as well as De Leon had already demonstrated by the experiments that the air of the operating room contains fewer bacteria and that these are much less dangerous. To prove this De Leon exposed culture media to speech through sterilized speaking tubes. In his second series of experiments Riese first exposed 274 control slices of fat removed at the close of operations to the air for from half an hour to two hours. This fat had been subjected also to the traumas and contaminations of the wounds from which they had been taken. However, during the operations gradually increasing silence had been enforced. For comparison other slices of fat removed just before suture of the skin were exposed to speech for only four minutes. Of the slices not exposed to speech 48.6 per cent were contaminated and 10.5 per cent of the latter showed pathogenic organisms. Of the slices exposed to speech 82.6 per cent were contaminated and 53.6 per cent of the latter showed pathogenic organisms. When absolute silence was observed during the operation the incidence of pathogenic bacteria was only 5 per cent.

According to these findings eleven twelfths of all pathogenic contaminations occurring today are to be ascribed to speech during operation when from 400 to 500 words are spoken without masks. Since its effect is only temporary, mouth hygiene even when most meticulous cannot eliminate this danger. Face masks should include both the nose and the mouth. The celluloid mask devised by Ochsenius in 1931 is good. Basket masks with a double layer of calico decrease the number of bacteria. However in his experiments with slices of fat Riese found that the decrease was only 55.6 per cent. Therefore the usual masks do not protect against saliva droplet infection. For certain protection against such infection it would be necessary to use a gas mask. As Subakov has done but a gas mask can be endured only for from one to one and a half hours. However the face mask is not superfluous even when complete silence is preserved as the surgeon or one of the other members of the operating room personnel may be obliged to clear his throat, cough or sneeze.

After 1878 Mikulicz operated in silence giving his orders by signs. Riese describes certain signs. Brunner and Rouffart (1931) likewise demanded silence. De Leon regards silence as impossible but Riese has proved it possible. Riese states that speech is permissible only when the patient is in danger and sign language is no longer adequate. When silence is maintained the assistants learn to pay stricter attention. Self discipline is necessary. Riese introduced silent operating in his hospital five years ago. He states that silence should be maintained in the operating room especially the room for aseptic operations, even when operating is not going on. He uses the basket spectacle mask with a covering of two layers of calico and an inlay of cellophane which can be thoroughly sterilized, stitched between the layers (Davis).

*The effect of silent operating and maximum sparing of the tissues on the statistics of suppuration.* In the year 1933 as the result of limitation of hemostasis the incidence of postoperative suppuration was 0.7 per cent in the total number of cases in which the author operated. 0.95 per cent after clean operations with opening of mucous membrane and 0.65 per cent after clean operations without opening of mucous membrane. Since 1933 that is, since silent operating has been his rule, suppuration occurred in only 10 (0.45 per cent) of 2,192 operative wounds with primary closure (without drainage). As 9 of the suppurations occurred in cases in which the intestine was opened their incidence in 1,143 such cases was 0.7 per cent. Of the 1,049 'clean' operations without opening of the intestine suppuration occurred after only 1 (0.095 per cent). In this group the effect of speech infection is seen most clearly since in 1929 the incidence of suppuration was still 3.7 per cent whereas in 1933 it was only 0.65 per cent. Of more than 1,000 operations of this type performed in the period from January 1934 to January, 1936 none was followed by suppuration.

In conclusion the author states that the entire personnel and the observers in the operating room should be silent and wear masks. Operating should not be done before students. For instruction moving pictures have a place.

Comparative figures and tables which show the various sources from which a sepsis is threatened are presented. (FRANZ FLORENCE A. CARPENTER)

Maddock W. G. and Collier F. A. Water Balance in Surgery. *J. Am. M. Ass.* 1937 108 1.

The authors have investigated the water exchange of surgical patients under various conditions to determine the water requirements by figures based on fact.

They first discuss the normal water exchange. The amount of fluid taken varies from 800 to 2,000 c.c. daily depending upon the weather conditions. The water content of food averages close to 70 per cent of its total weight, and in addition water is formed when the food is oxidized for energy. The total water from a routine maintenance diet amounts to from 1,000 to 2,500 gm. daily.

Very insignificant amounts of water are lost in the feces. The vaporization of water from the lungs and the skin, varying between 1,000 and 2,500 gms. daily, plays a big part in control of the body temperature and the vaporizing processes as well as the kidneys are little affected by the amount of water available.

The authors investigated the dehydration attendant on surgical operations. From restriction in food and fluid intake and increased fluid loss most patients become dehydrated on the day of operation. Eighteen patients undergoing a variety of procedures were studied. The amount of fluid lost by vomiting was insignificant. The blood loss was usually much greater than the amount estimated by the surgeon and varied from 800 to 1,272 c.c. depending on

the procedure. The greatest fluid output during the operative and four hour postoperative period was generally the vaporization loss. This made up 700 of the average 1,000 c cm lost by blood, vomitus, urine, and vaporization. The sweat loss could be reduced if the old fashioned postoperative "ether bed" were discarded. The custom of giving fluids parenterally on the operative day to patients who have undergone long, serious operations is well founded.

Usually more than 90 per cent of the water loss is imperceptible.

The authors' method to determine the loss of fluid for twenty four hour periods was to take the beginning weight of the patient and subtract the weight twenty four hours later minus the ingesta plus the excreta. Adult surgical patients vaporize from 1,000 to 1,500 c cm of water daily when convalescing smoothly. Patients with hyperthyroidism with warm moist skin will vaporize 1,500 to 2,000 c cm daily. Fever increases the production of heat and sweat, and thereby increases the vaporization losses. In general, water for vaporization for the sick surgical patient can be estimated safely at 2 liters.

Sufficient fluid for the urinary output is the next consideration. For the sick patient the authors believe an output of at least 1,500 c cm of urine daily is necessary. This volume depends on the kidney function. Normal kidneys can excrete all waste material in 500 c cm of urine a day, less than this indicates retention and an increase of non protein nitrogen. In cases of severe renal damage in which the kidneys concentrate urine to a specific gravity of only 1.014 to 1.020 the figures show that close to 1,500 c cm of water is required. The required volume of fluid increases as the concentrating ability of the kidney decreases, and a minimum output of 1,500 c cm daily will care for the excretion of waste material by the kidneys in all ranges of function.

Frequently "absolute losses" of fluid, such as, blood, vomitus, and drainage matter, as well as the loss from the intestinal tract from diarrhea, and exudation from the inflammatory surfaces must be considered. Such losses should be recorded and the deficit included in the daily requirements.

The daily excretions are the factors to be considered in maintaining a water balance. The authors summarize these excretions as follows:

1 Water for vaporization	2,000 c cm
2 Water for urine	1,500 c cm
3 Abnormal losses of water, blood, vomitus, etc	
	<hr/> 3,500 c cm

If the patient is taking some fluid by mouth, that amount may be deducted from the 3,500 c cm.

Patients entering the hospital in a dehydrated condition present an additional problem. They require water to maintain the body fluids and an

additional amount to restore the body fluid previously lost. As there are no quantitative tests to determine the degree of dehydration, the authors investigated normal subjects to determine the amount of water which could be lost before clinical signs of dehydration were apparent.

The signs of serious dehydration were apparent when the patient had lost an amount of water equal to approximately 6 per cent of his weight. This volume should be added to the daily requirement if the patient enters the hospital with signs of dehydration.

The kinds of fluid to be given were investigated. Some dextrose should be given to all patients requiring water parenterally. The indications for giving sodium chloride are not so simple. Observations by others have firmly established the value of saline solutions in replacing the sodium chloride loss associated with the loss of secretions from the gastrointestinal tract. However, the routine administration of saline fluids parenterally is deplored.

While many severe surgical conditions cause retention of water, the precipitating factor is frequently the indiscriminate use of saline solutions. The authors studied 3 groups of patients. One group received 5 per cent dextrose in normal saline and all of the patients retained water. When 5 per cent dextrose in distilled water was substituted the retention ceased promptly. The second group received 5 per cent dextrose in Ringer's solution and 6 of the 7 patients retained water. The third group received 5 per cent dextrose in distilled water and none of the patients retained fluid. It is apparent that warnings concerning the development of edema following the indiscriminate use of sodium chloride solutions are well founded. Edema is not frequently seen because such treatment is continued for only one or two days usually.

To avoid the administration of excessive amounts of salt, the carbon dioxide combining power should be determined. If low, 1,500 to 2,000 c cm of Ringer's solution may be given, but additional determinations should be made every two days. Another plan is to give Ringer's solution parenterally, in an amount equal to that of the vomitus. Eighty per cent of the patients studied received parenteral saline solutions simply because they were unable on account of their treatment to take sufficient fluid to maintain a normal balance by mouth—they had not been vomiting nor were they dehydrated.

The authors prefer the intravenous route of administering fluids. Cannulas are seldom employed. The rate of flow is never faster than 500 c cm per hour.

HARVEY S. ALLEN, M.D.

Huntton, R. D. *Issue Heating Accompanying Electrosurgery*. *Ann Surg*, 1937, 105, 270.

According to earlier clinical studies in which the thermocouple was used to measure the rise in temperature, high frequency currents employed in tissue cutting have an undesirable heating effect on the surrounding structures. In such studies the use

of thermocouples *per se* introduces a number of errors for which correction must be provided.

Tissue cells may be considered as a circuit of small condensers connected in series with small resistances and contained in body fluid which is a good conductor. The high frequency current is carried by the body fluid to the tissue cells or small condensers which in turn offer varying degrees of resistance to the passage of the current. The passage of the current through the tissues produces heat. The amount of heat generated depends upon the resistance, the time of the current flow, and the square of the current density. Under ideal conditions the amount of heat produced by the cutting loop is as the fourth power of the distance from the loop. However, use of this law for more than an indication of what to expect is practically impossible because the loop is used with varying speed, the tissues are not homogeneous, and the cutting is done under water.

The heat generated by the passage of a high frequency cutting current through a tissue can be measured by the thermocouple measuring circuit. However, the measurements so made may be greatly increased by secondary electrical effects on the thermocouple. The apparatus used by the author in measuring heating effects in tissue consisted of the usual thermocouple and a measuring circuit apparatus. Instead of a probe for measuring depth and distance from thermocouple a pyrex ring was employed to serve as a base through the center of which a depth gauge could be inserted. Gauge readings were accurate to  $\frac{1}{4}$  mm.

A measuring electrical heat circuit may yield erroneous results because of the following factors: (1) stray electromotive forces created by the presence of two dissimilar metals in a circuit; (2) lagging of the temperature of the couple behind that in the tissue; (3) failure of the galvanometer in circuit to indicate the temperature at the couple quickly enough with the occurrence of tissue cooling in the interim; (4) the use of some of the heat by the thermocouple itself; (5) the occurrence of a suspension distortion in the galvanometer deflection of 0.6 cm in a period of thirty minutes if the galvanometer is connected in the circuit all through the measurements; (6) an eddy current heating effect which is about the same regardless of the size of the thermocouple tips used; and (7) electrostatic pick up. The electrostatic pick up is the greatest source of error. This is due to a local heating or point heat effect as the current flows from the tissue to the thermocouple.

In the investigations reported in this article the author attempted to eliminate these sources of error. He cites the work of Caulk and Harris which showed that thermocouples coated with shellac increased the overheating error or electrostatic pick up. He found that three second cuts made with a Stern McCarthy loop with the thermocouple 3 mm from the bottom of the trough or wound produced a temperature rise of about 5.2 degrees C. The temperature readings in the experiments of Caulk and

Harris were higher by as much as 800 per cent. This was found by the author to be due to failure to eliminate the described sources of error. Thermal death in living cells can be produced when there is a temperature rise of 11 degrees. Therefore the sloughing and necrosis of tissue contiguous to the cut or coagulation made by the high frequency electric knife is not so great as is indicated by the work of Caulk and Harris.

BENJAMIN G. P. SHAPIROFF, M.D.

Webster J. P. Thoraco Epigastric Tubed Pedicles  
*Surg. Clin. North Am.* 1937, 17: 145

A pedicle flap consists of skin and subcutaneous tissue, the blood supply of which is preserved by maintenance of its usual connection to the body. There are 2 types of pedicle flaps: (1) the open pedicle flap and (2) the tubed pedicle flap. In the open pedicle flap the subcutaneous surfaces become contaminated by bacteria during the time they remain exposed externally before the flap is transferred to the defect.

The tubed pedicle graft is similar to the open flap except that its free lateral margins are approximated, the graft having therefore the appearance of a tube of skin. It has many advantages. There is no bacterial contamination and no disturbing serous discharge. Hospital dressings are reduced to the minimum. The tubed pedicle is easily mobile and flexible and does not shrink or contract. The pedicle can be left undisturbed *in situ* even for months until the patient is ready for operation. Most important of all, the surgeon can work with clean material and expect primary healing.

The thoraco epigastric region is an especially good area for long pedicle tube flaps. The flaps extend from the side of the chest down to the anterolateral aspect of the abdominal wall from the axilla down to the inguinal region. Even when the flaps are of considerable width the resulting defect on the abdominal and chest walls may be readily closed by suture. As the upper or lower end of the pedicle can be easily swung to distant areas without the use of intermediate sites, the patient is relieved of awkward positions and extra surgery is rendered unnecessary. The scar resulting from the formation of the flap is on a portion of the body which is covered by clothing and there is no resulting functional disability or physiological impairment.

The surface of the thoracic and abdominal regions is rich in small arteries and veins which run close to the superficial layer of the deep fascia where they divide, and extend upward to supply the subcutaneous fat and epidermis or down to the muscle. The main arterial branches are the long thoracic artery, the superior thoracic artery, the superficial inferior epigastric artery, and the superficial circumflex iliac artery. Superficial veins accompany these arteries. When the pedicle flap is first made the blood vessels ramify in all directions. After the seventh day an orderly arrangement is established with the blood vessels running in the long axis of the pedicle.

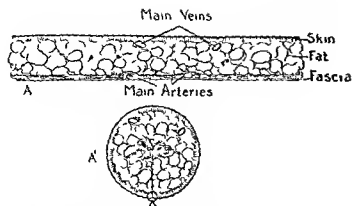


Fig. 1. Diagram of cross section of raised pedicle. A, Cross section of the skin. A', Cross section of tubed pedicle.

The tubed thoraco epigastric flap is formed as follows. The patient is given a general anesthetic—basal avertin supplemented by gas oxygen in the cases of adults and ether in the cases of children. Half of the body is prepared in the routine manner from the neck down to the inguinal region. The thoraco epigastric vein is identified and its course visualized by tracing it on the skin with a dye. The vein can be made more visible by washing the skin with alcohol or sterile saline solution. In the cases of adults the width of the flap is usually from 8 to 10 cm. The flap is cut so that the tracing of the vein lies in the center and the edges of the wound are equidistant and parallel with each other. To prevent tension and facilitate closure of the tubed pedicle, the anterior incision is started and ended at a lower level than the posterior incision (See diagram).

The pedicle is raised by dissecting between the superficial and deep layers of the deep fascia. Hemostasis is carefully secured. Uncontrolled hemorrhage in a tubed pedicle interferes with circulation and may result in necrosis. The tube is formed by turning the skin edges downward and rolling the raw surfaces inward. The skin edges are sutured with dermal sutures. Care must be taken to avoid tying the sutures too tightly. The tubed pedicle is retracted from the operative wound by gauze compresses. The wound edges of the abdominal wall are undercut so as to allow better skin approximation. The superficial layer of the deep fascia is closed with interrupted braided silk sutures. The skin edges are sutured with a finer silk, Deknatel C. The approximation is facilitated by means of intradermal wheals of methylene blue made at the beginning of the operation. Through a small transverse incision the operative region is drained dependently for from twenty-four to forty-eight hours. A long suture is placed through the drain so that the latter can be removed without changing the dressing. Wound edges are covered by longitudinal strips of gauze moistened in Dakin's solution. The dressing is not changed for six days; sutures are removed on the ninth day.

The described procedure may be modified by the surgeon if he fears that necrosis may occur in the

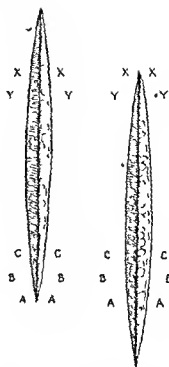


Fig. 2. Diagram after Davis and Katlowski, showing method of staggering parallel incisions. Single and double dots are made by the hypodermic injection of dye near the skin edges to facilitate even closure. The tube is formed by suturing Points B'B', C'C', etc. The skin is closed beneath the tube by suturing Points B B', C C', etc. Closure at each end will be made by bringing A to A', A', and X to X'. Interrupted sutures will close the projecting ends of each incision. This is the procedure advised for the formation of a long tubed pedicle made at 1 stage.

center of the tube pedicle. This is done by making a long anterior incision and a shorter posterior incisions parallel with the anterior incision. The pedicle tube therefore consists of an upper and a lower tube with a central bridge which may be formed into a tube after the blood supply has become well established.

In cases of emergency, when, after the tube is fashioned closure of the defect cannot be accomplished by the regular procedure because of the patient's condition, the surgeon can fill in the defect with Ollier Thiersch grafts or cover it with gauze impregnated with xeroform ointment. At a later date, when the patient's condition warrants, the defect may be sutured or filled in with a pinch graft.

BENJAMIN G. P. SHATIROFF, M. D.

Rovenstine E. A. Revivification Operating-Room Procedures. *Surg. Clin. North Am.*, 1937, 17, 93.

Experimental physiological evidence indicates that revivification can be accomplished after periods of suspended cardiac and respiratory activity. Vital functions may become paralyzed as the result of an overdose of an anesthetic agent, the depressant action of carbon dioxide, insufficient oxygenation in the lungs, anoxemia from hemorrhage or shock, toxemia, and anaphylactic reactions. Successful

revivification requires action against both respiratory arrest and circulatory collapse, as they are interdependent.

Artificial respiration provides for oxygenation of the tissues and the removal of carbon dioxide. It may reduce any toxic drug effect on the vital centers. It supplies the propulsive forces for the circulation of the blood. There are 3 methods for artificial respiration: (1) the Schaefer prone pressure, (2) the Silvester arm abduction, and (3) the Eve board tilting method. The Silvester method is the most practical in the operating room and can be used in combination with other emergency procedures.

Artificial respiration may be maintained by means of a tracheal catheter inserted under direct vision with a laryngoscope. Through this catheter oxygen and carbon dioxide may be rhythmically insufflated. The rhythm should simulate that of normal respiration. During the respiratory phase the mouth and nose should be closed to obtain maximum inflation. In the expiratory phase manual compression facilitates emptying of the lungs and acts as a cardiac stimulant.

During these maneuvers the patient should be in the Trendelenburg posture. By means of this posture the blood is drained from the splanchnic area to the heart so that a maximum amount of oxygenated blood is perfused through the brain with consequent retardation of cortical cell damage and central nervous system asphyxia which result in pathological damage of that structure as early as eight minutes after the onset of asphyxia.

The asystolic heart may be revived in a number of ways even though it may have been at a standstill beyond the eight minute limit. In the early stage of myocardial anoxia the cardiac musculature is highly irritable and may respond to exciting stimuli. Hearts that are not involved by a pathological process may be expected to react to revivification. Intracardiac injection may be of 3 types: (1) intrapericardial, (2) intramuscular, and (3) into the cavity of the heart. The solution of choice is adrenalin, which stimulates the myocardial junction. Since drugs unrelated to adrenalin have had a stimulating effect on the asystolic heart, local trauma may be the exciting factor. The puncture wound made by the needle may create an electrical action current which may be sufficient to incite a ventricular systole followed possibly by re-establishment of the nodal rhythm though initial action currents in the ventricle lead only to ventricular extrasystoles or possibly ventricular fibrillation which is not compatible with life. Stimulation of the auricle by needle prick may lead to auricular fibrillation which is compatible with life. It is therefore more desirable to stimulate the auricle. This can be done by an intracardiac puncture (with a needle  $\frac{1}{4}$  in long) through the third interspace close to the right margin of the sternum.

In event of failure there are other methods for revivification of the heart. The intravenous infusion of glucose with adrenalin combined with cardiac

massage and artificial respiration may prove useful. If the abdomen is open subdiaphragmatic massage of the heart or even incision into the diaphragm with direct rhythmic compression of the heart can be tried.

The entire operating room personnel should function as a team. The anesthetic should be discontinued and the patient placed in the Trendelenburg position. Meanwhile mouth to mouth breathing should be employed. The anesthetist should do an endotracheal intubation under direct vision with the aid of the laryngoscope, which should always be ready for use in every operating room. The surgeon may massage the heart or do an intracardiac injection. One assistant may give artificial respiration and the other the intravenous injection. The described procedure should be tried in every case of sudden death in the operating room.

BENJAMIN G. P. SNAFFROTT, M.D.

Uebelhoefer, R. A Study of Postoperative Retention of Urine (Studie zur postoperativen Harnverhaltung). *Zentralbl f. Chir.* 1930 p. 189.

The study herewith reported was made because of the author's observation that the retention of urine following operations on the rectum does not fall in the same category as postoperative retention in general. In its unusual persistence, the former differs from all other common postoperative retentions except the retention following major gynecological operations. It occurs not only after operations for hemorrhoids, the excision of fistulas, and especially extensive operations for rectal cancer, but also in inflammation in the region of the rectum and in abscess of the pouch of Douglas. Except after a radical operation for cancer of the rectum it does not differ essentially from the postoperative retention which occurs occasionally, for example after operations for hernia. Recognized causes are the difficulty experienced by many patients in urinating in the recumbent position, inability to contract the abdominal muscles because of wound pain, insufficient filling of the bladder because of the reduction in the intake of fluid the evening before the operation, and psychogenic disturbances.

Morphine often causes sphincter spasm. Essau claimed that in cases of inflammatory processes in the region of the rectum and bladder, and especially in cases of abscess in the pouch of Douglas, the edematous infiltration and tissue tension are responsible for retention. According to Henning and Schweizer, the retention is due to injury of the nerves of the bladder by the pressure of exudate.

Retention is especially frequent after operations for cancer of the rectum. Recently Goetze called attention to the fact that after such operations injury of the sympathetic and parasympathetic nerves of the bladder is also to be considered. The author presents a table from which the following conclusions may be drawn:

1. Retention of urine may occur without opening of the peritoneum, even after simple axial colostomy.

2 After the Goetze manipulation, disturbances of urination are quite common

3 Retention of urine is frequent after injury and denudation of the posterior surface of the prostate, detachment of the bladder, and injury or resection of the wall of the vagina

4 Extension of a tumor into the hollow of the sacrum and typical cancer pains do not of them selves cause urinary retention

5 Postoperative infection of the wound cavity causes inflammation of the bladder rather than urinary retention at first

Two nerve plexuses may be damaged the pelvic nerve from the sacral parasympathetic system and the hypogastric sympathetic plexus. Therefore, in the extirpation of the rectum, care must be taken to avoid injuring the pelvic nerve and this is apparently possible

The rest of the article deals with the effect upon the function of the bladder of irritation and division of the pelvic and hypogastric nerves. Irritation of the pelvic nerve leads to relaxation of the sphincter through contraction of the detrusors and bilateral section of this nerve to prolonged relaxation of the detrusors and retention of urine. Section of the hypogastric nerve increases the tone of the bladder, but this effect has not been satisfactorily explained

The author presents several curves of bladder pressure readings to clarify the postoperative bladder disturbances occurring after the radical operation for rectal cancer. It seems to him that injury of the pelvic nerve with irritation of the hypogastric nerve leads to urinary disturbances. With regard to the effect of irritation of the hypogastric nerve and injury of the pelvic nerve the data are inconclusive

Hennig and Schweizer believe that the retention of urine associated with abscess in the pouch of Douglas is due to a disturbance of nerve conduction caused by exudate pressure. If this theory is correct, the chief factor is irritation of the hypogastric nerve. Overdistention of the bladder and muscular decompensation must be other factors. Moreover, on cystoscopic examination, relaxation of the outlet of the bladder, the so called sign of Schramm, is also noted occasionally. This was observed by Goetze a long time after operation on the rectum. It is difficult to explain

In conclusion the author states that postoperative retention of urine is not always due to the same cause or to a single cause. The usual retention of short duration is probably due as a rule to a psychic or reflex inhibition and not to a local factor. The more prolonged retention following an operation performed at a distance from, or close to, the bladder may be related to an unrecognized disturbance of evacuation of the bladder and the direct effects of the operation. The prolonged retention after rectal and genital operations is the result of various disturbances, foremost among which are injury of the pelvic nerve and over distention and muscular decompensation of the bladder wall. Domination of the sympathetic innervation as the result of irrita-

tion of the hypogastric nerve is an uncertain cause

The usual medical measures for the treatment of postoperative retention of urine are seldom successful after rectal operations. An injection of pilocarpine is often contra indicated by the patient's general condition. The therapeutic factor of chief importance is timely use of the catheter. Delay of catheterization for fear of cystitis is unjustified

(L. GLASS) CLARENCE C. REED, M.D.

Dixon, C. F., and Deuterman, J. L. Postoperative Bacteroides Infection. Report of 6 Cases. *J. Am. Med. Ass.*, 1937, 108: 181

At the Mayo clinic, infection with bacteroides funduliformis has occurred in 6 cases in which operation was performed for carcinoma of the large intestine, in 2 cases in which operation was performed on the male genito urinary tract, and in 1 case in which operation was not performed. The authors make a report on the first 6 cases

The series of patients included 2 females and 4 males. In 4 of the cases, bacteroides funduliformis septicemia occurred after exploratory laparotomy had been performed for carcinoma of the rectum and in 1 case it occurred after operation had been performed for carcinoma of the rectosigmoid. In the case in which recovery occurred, bacteroides funduliformis was obtained on culture of the material from the wound

In most of the cases the liver was affected and the degree of jaundice varied from the moderate to the extreme. The jaundice occurred from four to seven days after the onset of the postoperative infection and usually progressed to an extreme degree. In 2 cases jaundice was not present, and in one of these the patient recovered

An apparently distinctive feature of postoperative bacteroides septicemia was profuse perspiration. The sweating that occurs in streptococcal septicemia is not nearly so severe as that which occurred in these cases. Exhausting chills and sweating occurred in every case except the 1 in which recovery took place and in which bacteremia was not present

The increase in the pulse rate usually was in proportion to the elevation of the temperature. In almost every case the quality of the pulse was good until a few days before death. In the 5 cases that ended fatally, death occurred from fifteen to twenty-one days after the onset of the septicemia

The presence of mild symptoms in the case in which recovery occurred may indicate that bacteroides funduliformis infection is more common than has been believed and that it may be present in cases in which short, postoperative febrile attacks occur. In the case in which recovery took place, the temperature was highest on the fourth postoperative day, and returned to normal a few days later. The presence of bacteroides funduliformis in the culture from the wound suggests that this organism may be a factor in postoperative complications

Blood cultures may not become positive for from five to seven days after the onset of the symptoms

and they should not be discarded if there is no growth in forty-eight hours. When bacteroides septicemia is suspected, repeated blood cultures should be taken.

As no specific treatment is known, the usual supportive measures were used. A positive water balance was obtained by the intravenous administration of dextrose in a physiological solution of sodium chloride. Most of the patients were able to take fluids by mouth until they became confused by the severe toxemia. A 1 per cent solution of gentian violet was administered intravenously in those cases in which early infection of the blood stream occurred. An oxygen tent was used when dyspnea or cyanosis was present. When pruritus accompanied the jaundice it was not of sufficient intensity to require treatment. A solution of dextrose was administered intravenously when evidence of hepatic damage appeared.

**Brewer, J. H.** The Present Status of the Sterility of Catgut Sutures on the American Market. *J Am M Ass* 1937 103 722

The survey reported in this article was undertaken with 2 objects in view: (1) to study critically the technique which has been employed heretofore in testing the sterility of catgut sutures to modify this technique as might seem desirable, and to describe it in such manner that it might be of use to the manufacturers of sutures and others interested in the control of these products; and (2) to determine the sterility of sutures now available on the American market, especially those recently manufactured as compared with those on the market some years ago.

In considering all of the sutures tested it was found that practically the same proportion of manufacturers have had non-sterile products. If only sutures of recent manufacture are considered the percentage of firms placing non-sterile products on the market drops from 43 to 12.5, indicating that fewer non-sterile sutures are being manufactured today than formerly. Of the 30 non-sterile sutures found, 25 were found among the 220 old sutures examined and 5 among the 800 sutures of recent manufacture.

While it is apparent that there is need for adequate control of the sterility of catgut sutures manufactured and sold in America, it is probable that publication of the results of Melepey and Chatfield and of Clock has had considerable influence in improving the quality of sutures now being manufactured so far as sterility is concerned.

SAMUEL KAHN, M.D.

#### ANTISEPTIC SURGERY, TREATMENT OF WOUNDS AND INFECTIONS

**Wilson, W. C., Jeffrey, J. S., Roxburgh, A. N., and Stewart, C. P.** Toxin Formation in Burned Tissues. *Brit J Surg* 1937 24 609

The authors present a short review of the production of toxic substances in burns.

They investigated the toxicity of edema fluid in rabbits and concluded that the edema fluid is toxic after four hours up to a maximum of about forty-eight hours. Bacterial invasion of the edema fluid also becomes progressively more evident. The symptoms of toxicity in rabbits varied from almost immediate death to much milder symptoms. Hypotension was a consistent finding in all of the reactions.

Edema fluid from burns was also toxic when injected subcutaneously or intraperitoneally into rabbits but to a lesser degree than when injected intravenously.

No unusual post mortem changes were found in animals which succumbed early. In the others the liver was pale yellowish and abnormally firm. Microscopic examination showed fatty degeneration.

The authors found that the toxic principles were present in both the albumin and globulin fractions of the edema fluid. Heating the fluid to 60° C. for thirty minutes decreased its toxicity. Immunization with the edema fluid was unsuccessful.

ARTHUR A. SCHAEFER, M.D.

**Hilgenfeldt, O.** The Treatment and Pathogenetic Bases of Burns (Die Behandlung und die pathogenetischen Grundlagen der Verbrennungen). *Ergebn d Chir* 1936, 29 102

The author limits his discussion to severe burns those followed by general disturbances and according to medical experience, prolonged illness. Mild burns have no special characteristics and demand only observance of the rules of general wound treatment. The peculiarity of severe burns is due primarily to the fright caused by the accident, with all of its unfavorable sequelae, and to the thermic irritation and damage of numerous sensory nerve endings, the combined effect of which results reflexly in the initial nervous shock. The shock is maintained by the pain, the inflammatory processes in the region of the damaged tissue, changes in the blood, and the subsequent resorption of harmful substances.

A sharp differentiation between the stages in the course of the illness following a severe burn is impossible. It may be said only that after the end of the second day the severity of the disease picture is determined by the injury resulting from the resorption of the products of tissue destruction and bacterial growth. This injury becomes apparent very early—from six to eight hours after the burn. Much earlier ferments liberated from the damaged cells enter the blood stream. The most important injuries combine and reach their peak within from twenty-four to forty-eight hours. Therefore in cases of extensive burns the limit of the greatest danger to life is reached at the end of forty-eight hours.

As the result of the shock, the contractility of the vessels is decreased, the penetrability of the capillary walls is increased, plasma flows into the tissues, a local accumulation of large amounts of blood occurs, the amount of circulating blood is decreased, and there is a marked inflammatory exudation in the region of the thermally damaged tissues. The great

loss of fluid occurs at the expense of the blood and not at the expense of the other tissues. Even within an hour after the accident the erythrocyte is considerably increased but within from thirty-six to forty-eight hours it returns to normal. All of these changes result in a general decrease of the oxygen in the body as well as disturbances in the lesser circulation which have a particularly unfavorable effect on the brain and the regulating centers, a disturbance of the isotonicity of the blood, a change in the colloid condition and disturbances of the acid base balance.

As the result of the destruction of erythrocytes by the direct effect of the heat, there is a brown discoloration of the serum due to hemoglobinemia. Some of the damaged blood elements are removed from the blood stream by the spleen and the liver. If the number is greater, the rest are removed by the kidneys and, as a consequence, the renal tubules become clogged and partial or total failure of renal function occurs. Renal function is decreased also by a decrease in the chloride content of the blood. If the patient survives the mechanical injury of the kidney, this is usually relieved after two days, but the functional disturbance may persist. A true inflammation of the kidney, a "burn nephritis," does not occur.

After the first two days following the accident the patient's fate depends upon the condition and the course of healing of the wound. The changes in the adrenals are not among the chief causes of death. They may disappear completely in a short time, and they are not in any way characteristic of burns, as they occur also as the result of shock, the resorption of products of protein decomposition and the action of bacterial toxins. They occur earliest and are most marked in childhood. They do not constitute a contra-indication to the administration of adrenalin or drugs with an effect similar to that of adrenalin in the first days. They are evidence of the severe damage to the nervous system which renders it unable to overcome this injury and results also in pathologico-anatomical changes, even cerebral edema in not a few cases. To this is related also the behavior of the temperature. In man, abnormally low temperatures are found only in the axilla, whereas determinations made in the rectum and vagina at the same time may show life-threatening high temperatures.

The treatment is directed first against the pain and shock. Morphine is dangerous. Atropin has a sedative effect on the nervous system and, in combination especially with calcium, is to be recommended for its action on the blood vessels and its effect in reducing the tendency toward the development of inflammation. Of first importance in the treatment of the shock is the intravenous administration of fluid, at least the temporary administration of sodium chloride solution with the addition of a drug having an effect similar to that of adrenalin. With regard to the local treatment of extensive burn wounds the author calls attention to the disadvan-

tages of various procedures frequently employed and to the limited effect of antiseptic wound treatment. For the checking of infection drying methods of treatment are first to be considered. Of these, the procedure which has proved best is the tannic acid treatment re-introduced by Davison. In von Haerer's Clinic the old Stahl burn liniment combined with tannic acid is used as recommended by Kraft. The procedure is as follows:

If shock is present, an injection of ephedrin is given first. If the wound is grossly contaminated, it is irrigated. The tannic burn liniment is then prepared as quickly as possible. For this purpose the burn liniment is kept available in 1,000 ccm flasks, and a 50 per cent aqueous solution of tannin in 100-gm dark flasks. Both are kept cool. Before they are used, equal parts of the two fluids are poured into a sterile bowl and the yellowish brown mixture is stirred with a sterile spatula. Sterile pieces of linen are then dipped in the mixture and when well soaked with it are placed on the wound. Over these are placed a thin layer of cellulose and a loose gauze bandage. On the first day the dressing is changed 4 times, on the second day, 3 times, and thereafter twice daily until complete healing has occurred. The injection of atropin and calcium is continued as long as the condition of shock persists.

In conclusion the author discusses the treatment of cicatrices and the plastic operations performed for their removal.

(A. FRAENKEL) STANLEY J. SEEGER M.D.

**Flinm, W.** The Functional End-Results in Cases of Injuries and Loss of the Finger Tips Treated with Cod-Liver Oil and Plaster of Paris (Die funktionellen Dauerergebnisse der Fingerkuppenverletzungen und Verluste nach Lebertran Gipsbehandlung.) *Zentralbl. f. Chir.*, 1936, p. 2500.

According to Baumann, the treatment of wounds of the finger tips by means of accurately shaped and fitted flaps of soft parts does not yield satisfactory results. It often requires the sacrifice of a large portion of the member. The scars are absolutely unsatisfactory. With regard to free plastic procedures, Kirschner, Schubert, Braun, Meltzer, and others claim that the free skin flaps heal poorly and have little resistance and poor sensitivity. Thiersch flaps are generally not to be considered. Even the stump plastic with use of abdominal skin has failed to meet expectations.

Flinm investigated the end results of the cod liver oil and plaster dressing method and compared them with those of the finger tip plastic operation of Meltzer and Fillingner and Baumann's statistics on finger injuries. Of the numerous cases, he selected 100 in which photographs had been made of the original injuries. In no case was there a secondary panaritium or phlegmon, whereas, of the conservatively treated cases reviewed by Baumann, complications and necrosis occurred in 33 per cent. The length of treatment for 1 finger tip injury averaged forty-three days, that for 2 injuries,



seventy days and that for 3 injuries, sixty three days Meltzer estimated the duration of treatment at thirty four days Baumann estimated it at forty seven days for operative treatment and seventy eight days for conservative treatment

Of the 100 patients whose cases he reviewed, Flimm was able to re examine personally 44 with 60 finger tip injuries (13 over one year 21 over two years, and 10 over three years old) All of the patients who were re examined had returned to their former occupations Only 2 had been obliged to change to lighter work There had been no need for an intervening rest period The new skin was well cushioned and well supplied with blood There was no glossiness cyanosis or ulceration of the fingers Of 83 fingernail injuries a perfect finger nail had grown again in 55 whereas of 47 cases of fingernail injuries reported by Baumann good results were obtained in only 7 Parasthesias and hypersensitivity to touch were present in 12 cases Tables showing the objective findings of investigations regarding sensitivity and comparisons of these findings with those reported by Meltzer favor the cod liver oil treatment

In conclusion the author says that of 60 finger tip injuries the results were ideal in 36 good in 20 and poor in only 4 Five photographs are presented (FRANZ) CLARENCE C REED M D

Meleney F L and Johnson B A Further Laboratory and Clinical Experiences In the Treatment of Chronic Undermining Burrowing Ulcers with Zinc Peroxide *Surgery* 1937 1 169

To be effective in the treatment of burrowing ulcers, zinc peroxide must have certain physical characteristics These properties may be determined by heating it at a temperature of from 130 to 140 degrees C for from one to four hours When suspended in 10 parts by weight of distilled water, it then sediments rapidly leaving a clear supernatant fluid In the course of an hour bubbles of oxygen begin to form in the sediment and after twenty four hours the latter becomes flocculent and curdy with the evolution of a considerable quantity of oxygen Five grams in 50 c cm of distilled water should liberate from 10 to 20 c cm of oxygen in twenty four hours Further confirmation of effectiveness may be had by determining the amount of soluble oxygen produced in the supernatant fluid and by testing the antiseptic powers of the suspension against the organisms recovered from the lesion

The authors report 10 cases of chronic undermining ulcers which were treated with zinc peroxide The condition is a rare chronic infectious process which may occur at any age in either sex and on any surface of the body It is caused by the invasion of a micro aerophilic hemolytic streptococcus through a wound It is characterized by prolonged suppuration accompanied by the gradual development of an ulcer with undermined rolled in skin margins and sinuses which tend to burrow beneath the skin or into the deeper tissues along lymphatic chan-

nels, veins or fascial planes The ulcer gradually enlarges Its base is covered with grayish gelatinous anemic shaggy granulations Hematomas may form spontaneously in the granulation tissue Daughter ulcers may be formed by perforation of the skin from beneath or its inoculation from the surface There is usually a moderate fever with moderate pain in the wound The infection rarely involves muscle bone or blood vessels When these are invaded its irradiation is almost impossible

Early diagnosis is rare As a rule the process goes on for months with resulting severe destruction of tissue In early cases the diagnosis is usually missed because anaerobic cultures are not made

Every conceivable kind of antiseptic has been used in the treatment of such ulcers without effect There is some evidence that large doses of ultra violet light have a favorable effect The authors have demonstrated repeatedly that zinc peroxide will almost invariably halt the spread of the infection if it is brought into contact with every part of the infected surface Undermined flaps and sinuses should be widely opened and the infected surface flooded with a creamy suspension of the zinc peroxide in equal parts of distilled water The wound should then be packed with fine meshed gauze soaked in the same solution and sealed with vaseline gauze to prevent evaporation Every twenty four hours the dressing should be changed and the wound cleansed of exudate by washing it off with distilled water or saline solution As soon as the undermined flaps have healed down and new skin has begun to grow in from the margins, the ulcer may be covered with skin grafts of the Reverdin type After twenty four hours the grafted area should again receive a thin suspension of the zinc peroxide until healing has occurred Frequent cultures should be made

Under zinc peroxide treatment the organism rapidly loses its anaerobic character and its hemolytic property on blood agar plates The surgeon must constantly watch for evidences of reactivity and re apply the zinc peroxide when reactivity is found

HARVEY S ALLEN M D

Saegesser M Experimental Investigations Regarding the Therapy of Tetanus (*Experimentelle Untersuchungen zur Therapie des Tetanus*) *Hd d med Lita* 1935 2 533 710

I Magnesium sulphate as a spinal anesthetic Magnesium sulphate is still rejected by many as a spinal anesthetic However, at the Berne Clinic its intraspinal use in the treatment of tetanus has not been given up In every spinal anesthesia there are (1) the danger of respiratory paralysis (2) a marked decrease in the blood pressure, and (3) the difficulty of limiting the anesthetic zone With the use of magnesium sulphate there is no appreciable drop in the blood pressure According to some respiratory paralysis occurs as the result of the direct action of the magnesium sulphate upon the medulla while according to others it is due to brain anemia caused

by paralysis of the constricting nerve fibers in the anterior roots. The author has proved without exception that respiratory failure during the intralumbar use of magnesium sulphate is due to direct contact action rather than to brain anemia. To determine diffusion relationships by magnesium sulphate, experiments were carried out only *in vitro*. These are described in the original article. On account of its high specific gravity (1.083), the 25 per cent solution shows considerable differences from other spinal anesthetics, for instance, it is much more dangerous to the respiratory center. It is necessary that the patient lie on his abdomen. In this position a lasting binding of the solution in the lower portions of the spine and a considerable decrease of the concentration toward the medulla are obtained. The latter is still further decreased by increasing the viscosity of the solution by adding 40 per cent glucose solution. Also, barbotage (an increase of mechanical mixing) is practiced. Therefore, smaller doses are more practical. Therefore, the danger of respiratory failure is combated with the ventral position, the administration of glucose solution, and with barbotage.

As the pressure of the spinal fluid in tetanus is often very much increased, a withdrawal of some of the fluid is of value, but better diffusion is not obtained thereby. A decompression of the venous plexus takes place and, with it, quicker absorption. The withdrawal of fluid must not be too large as the depth and duration of the anesthesia would be too much decreased.

At times the magnesium sulphate solution fails to act because of irritation of the spinal meninges. As a result of this irritation the solution which has been injected into the dura is discharged more rapidly. In such cases the dose must be increased.

*II Experiments with combined avertin, serum, and urotropin therapy.* Schaefer believes that avertin does not only relieve the rigidity of the muscle, but also acts specifically, as the liquor barrier becomes more permeable to the serum. Saegesser employed avertin serum and a 40 per cent solution of urotropin in his experiments. Avertin contains bromine, which possesses a powerful affinity for the ganglion cells. According to Kaspar, avertin has no specific action, but saves the strength of the body and thereby makes possible the neutralization of the toxin. Avertin paralyzes the ganglion cells, while toxin stimulates them. The more avertin administered, the more promptly the toxin becomes liberated from the cell lipoids and exposed to the action of the antitoxin, if the antitoxin can pass the liquor barrier. Urotropin must be administered in order to increase the permeability. In addition, urotropin gives off formaldehyde, which has even a stronger affinity for the lipoids. The avertin is a "carrier" for the serum. The intravenous injections were given to guinea pigs infected experimentally with tetanus. Four control animals died, the others survived the tetanus. In spite of the combined treatment it was found that the toxin which already

had become fixed could not be neutralized. Even though the rigidity passed for a time, it always returned. However, the combined treatment prevents its progression. Of the 15 animals, 12 could be saved. For the treatment of human tetanus the author recommends 50 ccm of concentrated serum containing no albumen, 50 ccm of 5 per cent avertin-kalorose in a 5 per cent solution, and 10 ccm of 40 per cent urotropin solution with a definite rapidity of diffusibility. This combined solution is to be injected intravenously with the Kirschner instruments. When the rigidity remains in spite of this treatment, he believes magnesium-sulphate solution is the agent of choice.

*III The metabolism in tetanus.* A The blood sugar is higher than normal. The hyperglycemia is due to the increased formation of sugar in the liver from the glycogen. This increase results partly from central and partly from peripheral irritation. B The glycogen content of the muscles and liver decreases. The impoverishment or atrophy of the musculature is due to the tetanic muscular rigidity and not to the inanition. High grade liver degeneration is of decisive importance for the outcome of the disease. Experiments conducted on animals with glycogen impoverishment and experimental tetanus proved this conclusively. The glycogen-fixation ability of the liver suffers gradually. The author investigated the influence of increased glycogen formation and found that the injection of insulin and glucose delayed death for from one to three days. Both the liver and the muscle glycogen values were considerably above those of the control animals. C The lactic acid is increased also. This signifies a considerable disturbance of the resynthesis of the lactic acid produced by muscular activity. An increase of lactic acid is also the direct result of liver injury. Furthermore, there is a direct output of carbon dioxide and water. In every case of tetanus there is a lack of oxygen. Every ten minute administration of oxygen produces a decided drop of the lactic acid in the blood. Therefore, the administration of oxygen is indicated immediately after the onset of convulsions. D The acid base balance is deviated strongly toward the acid side. Therefore intravenous administration of disodium phosphate is necessary.

Saegesser then attempts to show that the favorable prognosis in head tetanus is the result of the short path and the early obstruction of the toxin, so that only smaller amounts affect the central nervous system. The ineffectiveness of amputation proves that there are other factors involved besides the toxin. The convulsions may be due to the lactic acid, as this can produce contractions of muscle tissue, but the question is not as yet decided. However, it is certain that disturbance of the acid metabolism lowers the threshold for stimulation or irritability. The lactic acid, however, is important also in another respect. The carbohydrate metabolism in the brain proceeds just like that in the muscular tissue. From the glycogen a lactic acid is

formed four fifths of which is resynthesized in the oxidative phase to glycogen and one fifth oxidized to carbon dioxide and water under normal conditions. This metabolism of lactic acid takes place in the brain in eclampsia uremia and diabetes coma. The increase of lactic acid induces a swelling of the brain and in tetanus this causes death primarily.

**Conclusion.** The interesting experimental investigations of the author have advanced the treatment of tetanus considerably. If the mortality of tetanus has dropped from 80 per cent to from 30 to 40 per cent as the result of serum therapy, it may now be possible to lower it still further with (1) the combined intravenous and intralumbar injection of serum (intralumbar injection during chloroform anesthesia) (2) combined avertin serum uterotropin therapy (3) the intraspinal injection of magnesium sulphate (25 per cent in 40 per cent glucose solution) with barbotage, (4) the administration of chloral hydrate and somnifen or (5) the administration of alkalies and glucose and insulin with oxygen therapy.

(FRANZ) LEO A. JUNKKE, M.D.

**Kaspar M.** The Importance of Tetanus Antitoxin in the Prophylaxis and Treatment of Traumatic Tetanus (Die Bedeutung des Tetanusantitoxins in Prophylaxe und Behandlung des Wundstarrkrampfes) *Beitr. klin. Chir.* 1936, 204 31.

The question of the importance of prophylactic measures against traumatic tetanus has not yet been answered satisfactorily. At one time the decrease in the frequency of the condition in Germany was believed to be due in part to the improvement in the treatment of wounds. At another time it was attributed to removal of the German troops from the infected Aisne region. In the period after the World War there were reports of cases in which in spite of timely serum prophylaxis death from tetanus occurred. Against comparisons between the mortality of tetanus over long periods of time before and after the introduction of serum prophylaxis are the facts that the number of injuries has greatly increased as the result of the great increase in traffic accidents and that in the compilation of such statistics no investigation was made to determine whether serum was injected in the fatal cases.

As a result of his ten years' experience in Nuernberg and Dortmund the author believes that prophylaxis is necessary. He states that the injection must be made at the right time—that is, within two days—and the dose of 2,500 antitoxin units must be increased the greater the injury, up to 12,500 antitoxin units. As the protective effect is limited the serum should be given not only before new operations but also in cases of infected, markedly suppurating wounds. The injection should be repeated after two weeks and then every week because the antitoxin content of the blood diminishes rapidly.

With regard to danger from the serum Hinstorff found that within a period of two years 147 patients developed anaphylactic shock and 8 of these died. In a series of 18,000 injections Mosters had

1 death in a series of 2,000,000 injections, Bruce had 2 deaths and in a series of 100,000 injections Pfandler had 3.

The replies to a questionnaire sent out by the *Zeitschrift fuer aerztliche Fortbildung* showed that opinions differ that relatively few clinics are radical supporters of prophylaxis, but that in the majority of them injections are given in selected cases. The author believes that prophylactic injections should not be limited chiefly to cases of severe injuries with marked contamination since small even very minute injuries which usually do not receive medical attention are very often responsible for tetanus. These also require excision (the first requisite) and prophylaxis. He states that of the many thousands of slight and very severe injuries which were treated in his surgical clinic by excision and prophylactic injections of antitoxin in the last decade, not one was followed by traumatic tetanus. This was true even in cases in which healing took place with suppuration. He excludes from prophylactic treatment only practically sterile small incised and puncture wounds which bleed freely and superficial or uncontaminated abrasions of the skin. The danger of anaphylaxis does not deter him in the use of antitoxin. He states that the second injection should be a high titer beef serum since, after the tenth day, there is increased sensitivity to the same serum. Buzello recommends subcutaneous rather than intramuscular injection. The Besredka method of desensitizing has not met expectations. Attention is called to the fact that shock does not occur if the serum is given under anesthesia. All of the very rarely observed paralyses in the region of the brachial plexus disappear.

Many leading clinicians still hold the view that the serum has no curative value. This opinion is incorrect. Formerly the mortality of tetanus was estimated at from 80 to 90 per cent. Permin reported that in 209 cases not treated with serum which were observed up to the year 1914 the mortality was 79 per cent. In those with an incubation period of less than ten days it was 94.7 per cent whereas in those in which the incubation period was more than ten days it was 70.2 per cent. In 288 cases treated with serum the mortality was 57.7 per cent. In those with an incubation period of less than ten days it was 72.8 per cent and in those with an incubation period of more than ten days it was 40 per cent. In 31 cases of tetanus treated by Kreuter the incidence of cure was 64.5 per cent. In those with an incubation period of less than ten days it was 35.7 per cent and in those with an incubation period of more than ten days, 87.8 per cent. According to these figures a favorable effect of serum treatment is not to be doubted. However, very large doses must be given, namely, a total of from 600,000 to 900,000 antitoxin units.

The investigations of De Schaefer have shown that with injection into the lumbar cord the antitoxin which diffuses with great difficulty does not reach the blood stream until after thirty minutes because it is unable to overcome the threshold of

the spinal fluid. A neutralizing effect on the central nervous system therefore remains very problematical. On the other hand, when the antitoxin enters the blood in very high dosage the threshold of the cerebral blood is overcome. Accordingly, the injection should be given only intravenously and the serum should be combined with avertin.

(FRANZ) LOUIS NEUWELT, M D

Frankl, J. The Curative Effect of Prontosil in Erysipelas (*Ueber Heilwirkung des Prontosil bei Rotlauf*). *Ortosi heil*, 1936, p. 990.

The hydrochloric acid salt of 4 sulphonamid 2', 4' diamino azobenzol, a yellowish red, crystalline powder in tablets of 0.30 gm, and in a 2½ per cent solution for intramuscular injection, is called prontosil. In the Berde Clinic, Pecs, Hungary, the preparation has been used for erysipelas since 1935. With the exception of 1 case, it has always been administered by mouth—1 tablet 3 times daily for three days, making a total dose of 2.7 gm. Only in rare instances has more than this amount been administered. The tablet is taken with water after meals. The accompanying effects described in the literature were not observed by the author. The patient is kept in bed until normal temperature has returned completely. He is given vapor dressings (aluminum acetate solution 1:10) and with the exception of an enema, is not given any other treatment. Six or seven hours after the first tablet is taken the urine becomes brownish red, and from eighteen to twenty hours after the last tablet is taken the urine has returned to its normal color. The secretions and feces do not show any change in color. In all, 40 patients with erysipelas were treated (14 men and 26 women) the great majority being from thirty one to forty years of age.

On the basis of the clinical symptoms, the critical sinking of the temperature in the second half of the first twenty four hours, the subfebrile temperature on the second day, and the normal temperature on the third day, and on the basis of the results of the numerous blood examinations, the author asserts that prontosil is very effective in the living body, even in high dilution. This is true also of mercury and arsenobenzol. And further, prontosil is extremely effective against cocci in the same manner that arsenobenzol is effective against spirochetes. Of the many different kinds of medicinal agents, prontosil seems to be the most effective, and in addition it is very easily administered. It is an excellent agent for the treatment of erysipelas. Since it has been used in the Clinic, the mortality from erysipelas has been nil. Complete recovery occurs within a few days. Therefore, prontosil is a valuable addition to the physician's store of remedies.

(E. ILLF) JOHN W. BRENNAN, M D

Loehr, W. Wound Diphtheria (Wunddiphtherie). *Zentralbl f. Chir.*, 1936, p. 2482.

At the conclusion of the World War there was without doubt an epidemic of wound diphtheria

which was perhaps related to the severe influenza. At that time Loehr studied the condition at the Kiel clinic. In the period from October, 1919, to June, 1920, there were 122 cases of wound diphtheria at that institution. The numerical increase and decrease of the condition paralleled the reports of cases of throat and nose diphtheria. Most of the patients with wound diphtheria were apparently infected before they entered the clinic. The simultaneous mass diseases in Magdeburg were also of an epidemic character. The Kiel clinic differentiated 5 types of wound diphtheria: (1) that without a characteristic appearance, (2) that with an easily removable coating, (3) that with a diphtheritic coating, (4) a phlegmonous type, and (5) that following resections for influenza empyema. In the first 2 types there were usually no wound disturbances, even Thiersch flaps healed on. In the third type the edges of the wound were a peculiar red and showed disintegration of the epithelium. This type occurred in amputation stumps, cases of chronic osteomyelitis, phlegmons of tendon sheaths, and chronic mastitis, and 1 case of roentgen ulcer. Three of the patients with this type died of heart failure. In some cases postdiphtheritic paralyses occurred. The phlegmonous type of wound diphtheria occurs in early childhood, especially in umbilical processes. The lesion resembles progressive gangrenous skin inflammation and hospital gangrene.

In the treatment it was found that the bacilli which were sometimes demonstrated in the wound for as long as ten months could not be removed by any agent. Even local serum treatment was of no avail. The administration of serum had only a general effect and did not prevent paralyses.

Reports from other German clinics also called attention to an increase in the incidence of wound diphtheria, but after 1923 such reports decreased and only isolated cases were observed.

Loehr reports the case of a twenty nine year old woman upon whom, last winter, a colostomy was performed because of cancer of the rectum. The patient withstood the operation well and became ambulatory. Suddenly, in conjunction with a heart attack, a change occurred in the artificial anus. Although the abdominal wound was well healed, the mucous membrane of the artificial anus became grayish green. A diagnosis of wound diphtheria was made. The patient was given an injection of serum and a blood transfusion. On the evening of the same day she died of another heart attack. Autopsy disclosed nothing to explain the sudden death, but smears from the mucous membrane of the artificial anus showed diphtheria bacilli. This finding explained also the sudden deaths of 2 children with chronic osteomyelitis which had occurred a short time previously. In the cases of these children normal granulations had suddenly assumed a grayish green appearance and death occurred suddenly from heart failure. Loehr therefore concluded that wound diphtheria had developed also in these

cases. He therefore had smears taken from all wounds. Of 300 wounds diphtheria bacilli were found in 29. The latter were chronic wounds. In none was there much disturbance of healing. The patients were immediately isolated.

As at Kiel, the disease completely disappeared with the beginning of spring. At that time there were discovered in the hospital several persons who harbored diphtheria bacilli in their throats. Among them were 5 patients. However, as diphtheria bacilli were found in patients who were admitted to the hospital with suppurating wounds, the infection cannot be assumed to have been entirely of hospital origin. In the children's wards diphtheria infection was dangerous during the winter. Of 154 children admitted during the period from December 1, 1931 to June 1, 1936 wound diphtheria occurred in 15 and diphtheria of the throat in 14. It is possible that many of the latter were infected by the former. Inquiry of a number of hospitals in the city and its vicinity disclosed that they also had observed a number of cases of wound diphtheria during that period. Accordingly there was an epidemic. This is in agreement with the fact that in Germany diphtheria has been increasing during the last three years. Therefore routine wound studies are again indicated. The author presents statistics for the years from 1918 to 1935 in a table.

The diagnosis of wound diphtheria cannot be based on a single diphtheroid coating as a similar coating may be caused by staphylococci and especially by streptococci. Quarantine is imperative. Serum treatment should be given early. However the local use of serum is of no value. Special attention must be paid to chronic wounds. In the cases of children active immunization with formal toxoid comes up for consideration.

CLARENCE C. REED, M.D.

Long, P. H. and Bliss, E. A. Para Aminobenzenesulfonamide and Its Derivatives. Clinical Observations on Their Use in the Treatment of Infections Due to Beta Hemolytic Streptococci. *Arch. Surg.*, 1937, 34, 351.

In the treatment of infections due to beta hemolytic streptococci the authors have used (1) a 2.5 per cent solution of prontosil which is always given parenterally, (2) prontosil tablets, (3) protilyn tablets and (4) chemically pure para aminobenzenesulfonamide. They believe that these substances act by inhibiting the growth of the streptococci and injuring them so that they may be phagocytized. In practically all of 70 cases there was prompt and marked clinical improvement. The only death which was believed to represent failure of the treatment was that of an infant which was treated for twelve days for peritonitis. Of the 3 other deaths 1 occurred seven hours after the beginning of treatment for a hemolytic streptococcus erythema of several days duration and 2, twenty and thirty-five hours respectively after the beginning of treatment for Ludwig's angina.

The authors have found that about forty-eight hours are required before maximum effects can be obtained with para aminobenzenesulfonamide or its derivatives.

When they employ a 2.5 per cent solution of prontosil, the total amount administered during the first twenty-four hours is 1 c.c.m. for each pound of body weight up to 120 lb. This amount is divided into 6 parts and a dose is given every four hours by subcutaneous injection.

The protilyn tablets are given by mouth. The total dose for the first twenty-four hours is 1 gm. for each 20 lb. of body weight up to 100 lb. This amount is divided into 4 doses.

In severe infections the authors have given para aminobenzenesulfonamide dissolved in sterile physiological solution by subcutaneous injection.

The amount of the drugs required after the first twenty-four hours depends upon the clinical condition of the patient. For severe infections the authors advise continuing the treatment given in the first twenty-four hours until definite improvement occurs. In mild chronic infections it is necessary to administer the drug over a long period of time. The authors have noted no ill effects from the oral administration of these drugs over a period of several weeks.

They state that there is little evidence that para aminobenzenesulfonamide or its derivatives are appreciably toxic for human beings. The only evidences of toxicity are nausea, ringing in the ears, and slight dizziness and these are of short duration. Fever may result if a 2.5 per cent solution of prontosil is given in a single dose of 100 c.c.m. or in repeated smaller doses subcutaneously. In none of the authors' cases have the toxic manifestations been severe. The question as to whether delayed toxic effects may occur cannot yet be answered.

HARVEY S. ALLEN, M.D.

## ANESTHESIA

Dunphy, J. E., Alt, R. E., and Reiling, W. A. Evipal Anesthesia. A Clinical Study of 300 Cases. *Surgery*, 1937, 1, 53.

The introduction of sodium evipal to clinical use has provided the surgeon with an anesthetic which is remarkable for the ease of its administration, the rapidity with which it induces anesthesia, and the absence of unpleasant sequelae following its use. Evipal has a wide margin of safety. When lethal doses were administered to laboratory animals the respiratory center was affected before the heart, and if the anesthesia was not too deep the animals could be revived by artificial respiration.

The intravenous injection of sodium evipal usually induces the rapid onset of quiet anesthesia which is not unlike natural sleep. Respirations are slowed and slightly deepened. The pulse if previously rapid, tends to become slower and frequently there is a fall in the blood pressure. In favorable cases with the use of pre-operative medication, deep anes-

thetia sufficient for dilatation of the rectum or opening of the abdomen can be obtained. By fractional administration of the drug full anesthesia can be maintained for an hour or longer.

Most observers consider rapidity of recovery to be one of the advantages of evipal anesthesia, but the authors have found the recovery rate to vary considerably with the duration of the anesthesia. In simple cases, in which only from 3 to 5 c cm of the drug are used, recovery is usually immediate and remarkably free from unpleasant after effects. Occasionally, however, even with small doses, it may be prolonged. Although even when prolonged it is usually free from unpleasant sequelae, evipal has proved inferior to nitrous oxide for operations of long duration.

Certain features of evipal anesthesia require particular emphasis. Evipal possesses the disadvantage, common to all intravenous drugs, that, once administered, its action is irrevocable. This fact alone renders the fractional method of administration imperative. As no rule can be established with regard to dosage, the fractional method should be used invariably.

The preoperative administration of morphine is of definite value in obtaining satisfactory relaxation. The recovery period is not prolonged by preliminary medication.

The drug causes a pronounced fall in the blood pressure which in some cases is so striking that the prolonged use of evipal in major operations may predispose to shock.

The drug is a definite respiratory depressant. This has been emphasized by all observers and unquestionably constitutes a real danger. In most cases of temporary cessation of respiration too rapid administration of the drug seemed to be the cause. In certain cases evipal may induce severe asthma. In 2 of the authors' cases the attacks came on immediately after the injections were started. They were characterized by marked cyanosis, stridor, and irregular labored breathing. In both cases they subsided as soon as full anesthesia was obtained, but recurred in an equally alarming manner during the recovery period.

Rapidity of recovery and freedom from unpleasant sequelae are considered to be 2 of the great advantages of evipal anesthesia. Nausea and vomiting are rare, headache is not common. Postoperative excitement occurs occasionally, particularly in alcoholics, but is usually transient.

A postoperative complication of considerable importance is a state of amnesia. Five of the authors' patients suffered from this condition for periods of from thirty minutes to twelve hours after apparently complete recovery. The authors therefore believe that the use of evipal in the cases of outpatients is contra indicated unless they are to be hospitalized or special arrangements are made to care for them during their return home.

They inject from 2 to 4 c cm very rapidly (that is, at the rate of 1 c cm every ten seconds) and then

wait thirty seconds to observe the result. A short pause following the initial injection is very important because, although the curve of effectiveness of evipal rises very quickly, as Killian has emphasized, the maximum effect is not reached for several minutes. It is therefore possible to exceed the fatal dose in the first few seconds of administration.

Following the initial injection, the patient, who has been instructed to count, usually stops counting suddenly, gives a long sigh, and passes into fairly deep anesthesia. One more cubic centimeter is then injected and the operation started. As needed, more evipal is injected in amounts of from  $\frac{1}{2}$  to  $1\frac{1}{2}$  c cm. If tremor is marked or there is extreme rigidity, more evipal is needed. Apart from the obvious signs of awakening such as moving or moaning, the most helpful indications of the depth of anesthesia are the rigidity of the jaw and the size of the pupils. If the anesthesia is deep, the pupils are large and fixed, while with regaining consciousness they become smaller and react to light. The maximum dose should not be over 15 c cm.

Jarman and Abel consider liver damage, a low blood pressure, the sitting position, and previous medication with habituates as definite contra indications to the use of evipal. As the available evidence points to the liver as the principal organ detoxifying evipal, it seems reasonable to consider jaundice, cirrhosis, or other evidences of liver damage as a definite contra indication. The presence or imminence of shock and marked debilitation are also definite contra indications.

HOWARD A. MCKNIGHT, M.D.

Hellstrom, J. Sacral Anesthesia (Veber Sakralanestesi). *Lita chirurg Scand* 1936 79: 1.

The author gives an account of the mode of action and distribution of sacral anesthesia and concludes that the so called low sacral anesthesia, according to Lawen, is also largely a parasacral and paravertebral anesthesia. This is evident, for example, from the author's experiments on cadavers and from clinical investigations.

The author's own material is made up of 1,053 sacral anesthetics. In more than 900 cases he used 1 per cent tucocain to which adrenalin had been added. The injections were made with the patient lying on his side. A detailed account of the technique employed is given. No serious complications occurred. Anesthesia was satisfactory in 87.4 per cent, fair in 10.1 per cent, and absent in 2.5 per cent of the cases.

The blood pressure was studied in 100 consecutive cases. In some it had increased while in others it had decreased. The upward or downward variation averaged 15 mm.

The author discusses the advantages and disadvantages of sacral anesthesia and concludes that it is simple, reliable, and harmless, and well suited for the out patient department. Its chief use is for endovesical and endo-ureteral examinations and operations.

**Elstad D** A Case of Nerve Injury with Fatal Result after Spinal Anesthesia with a Symptom Free Interval of Four Weeks (Ein Fall von Nervenleiden mit toedlichem Ausgang nach Spinal anaesthesia mit symptomfreiem Intervall von vier Wochen) *Norsk Mag Laegevidensk* 1936 97 959

A forty two year old man was operated on for appendicitis under spinal anesthesia with 0.20 parocain. The anesthesia extended up to the costal arch. Four weeks after operation severe neuralgic pains developed without any premonitory symptoms in the right leg and parts of the right arm. The patient also complained of headaches and double vision and suffered from colics and vomiting. In the next few days paresis of the right leg, the right arm and the right facial and abductens nerves developed. The patient had difficulty with speech. His psyche and consciousness were normal. There was no fever and no rigidity or disturbance in coordination. The reflexes were normal except for the right plantar reflex which was exaggerated. In the next few days complete paralysis developed in the paretic areas and light paresis in the left leg. Lumbar puncture revealed clear fluid. There was some doubt as to whether the pressure was increased or not. The cell count was normal. The Pandy test showed ++, and the Nonne Phase was 1+. The

Weichbrodt sublimate test produced a weak opalescent fluid. The albumin estimation according to Si card was 1.19 per cent. The Wassermann reaction was negative. Mueller's flocculation test was negative, and Meimcke's test was negative. The 'gold sol' and the mastic reaction showed maximal waves on the left side of the curve. Agar and bouillon cultures were negative. There was progressive paralysis in both legs and paresis of the back and neck muscles. Death occurred from failure of the respiration. Urinary disturbances were not observed. An autopsy of the brain showed no certain pathological changes.

The case presented difficulties in differential diagnosis. There was a question of whether the condition was acute disease of the nervous system or the toxic after effect from spinal anesthesia. Epidemic cerebrospinal meningitis, acute poliomyelitis as well as acute epidemic or lethargic encephalitis could be ruled out. There was a possibility that it was toxic degenerative polyneuritis, although there was no evidence of irritation or involvement of the sensory nerves. The author raises the question as to whether the toxic polyneuritis was really caused by the spinal anesthesia but he does not answer it.

(KORTZINSKY) JACOB E. KLEIN, M.D.

# PHYSICO-CHEMICAL METHODS IN SURGERY

## ROENTGENOLOGY

Snure H., and Maner, G. D. Roentgen-Ray Evidence of Metastatic Malignancy in Bone. *Radiol* 03, 1937, 28 172

The study reported in this article was made because of the frequent demonstration at autopsy of metastases from malignant tumors to bones which were not evident in the roentgenograms. At autopsy in the cases of patients dying of malignancy a portion of the spine was removed, sawed lengthwise in the sagittal plane, and then, to avoid distortion, placed directly on the film holder. To determine the size of an area of metastasis that could be visualized in the roentgenogram, portions of the spongiosa were removed and the cavity was filled with muscle scraps, water, or paraffin. A cavity measuring 2.5 by 2.75 and 1 cm deep which was filled with paraffin showed practically no evidence of a change in the spongiosa. It therefore appears that the spongiosa accounts for the general density while the cortical bone accounts for the detail of the osseous structures. When an area of cortical bone 1 cm square was removed from the lateral surface of the body of a vertebra and the cavity filled with paraffin, the defect was visible in the roentgenogram. Similar observations were made when other bones such as the tibia, os calcis, and ribs were used. In 2 cases of myeloma the only evidence of bony metastasis was a generalized demineralization.

Attempts to duplicate the defects frequently produced in vertebral bodies by rupture of the nucleus pulposus were likewise unsuccessful. The authors therefore conclude that the dense crescentic shadows are due to a slow rebuilding of new bone rather than to a piling up of the small fragments of the trabeculae of the spongiosa displaced by the cartilage, and that a recent rupture of the nucleus pulposus is probably not evident in the roentgenogram. They regard it as reasonable to assume also that destructive changes in the marrow space due to infection may be invisible in the roentgenogram. Tumors with considerable fibroblastic change, they believe, usually give rise to the osteoplastic type of metastasis and are therefore visible in the roentgenogram.

EARL E. BARTH, M.D.

Johnson, S. E. Roentgen Kymography Considered in Relation to Heart Output and a New Heart Index. *Am J Roentgenol*, 1937 37 167

Heart output is one of the most important constants of the body. In spite of recent great improvement in methods of determining stroke volume no method has been developed which is suitable for general clinical application.

Several workers have attempted to measure heart output by various applications of roentgenography, and a high degree of success was achieved by Bar-

deen, Eyster and Meek, and Hodges. However, their method requires an elaborate set up which is not suitable for general use.

Roentgen kymography offers a simplified approach to the problem as the systolic and diastolic diameters of the heart are recorded on a single film and there are no synchronizing devices to calibrate or to get out of step. All measurements are made on the same film, and the kymographic index is derived according to the following simple formula. Six tenths of the transverse diameter of the heart equals the diastolic diameter of the left ventricle. This diameter minus twice the mean ventricular thrust as measured on the kymogram equals the ventricular diameter in systole. The difference in areas of circles of these respective diameters times the altitude or length of the ventricle then equals the roentgen kymographic (RKG) index. The RKG index therefore represents the estimated difference in diastolic and systolic volume of the left ventricle which, by some, has been incorrectly designated "stroke volume." The RKG index indicates merely the amount of change in the size of the pump during the two extremes of the heart cycle, and this, with only a relative degree of accuracy, as the length and diameter of the ventricle cannot be measured directly. Even so, it is thought that this method is more accurate than that in which the whole cardiac silhouette is employed.

In each of a series of 10 subjects the RKG index was compared with one or more output determinations (dye injection method of heart output determination). In normal individuals and in persons with hypertension the RKG index paralleled stroke volume. In the presence of incompetent valves the RKG index may be greatly increased above the stroke volume, probably in proportion to the degree of valvular incompetence. In constrictive pericarditis the index is greatly reduced, sometimes even to zero. In all cases of grave cardiac disease the RKG index has deviated significantly from the normal (i.e., the average of normal subjects). It is believed that the method can be developed into a useful aid in clinical diagnosis and prognosis.

Prussia, G. A Contribution to the Study of Experimental Tumors Caused by Thorotrast. (Contributo allo studio dei tumori sperimentali da thorotrast). *Sperimentale*, 1936, 90 522

There has been considerable discussion as to whether the injection of thorotrast may be harmful. In animals injected with doses proportional to those used for man the findings have generally been negative. Of the investigators who have examined the parenchymatous organs of human subjects injected with thorotrast, the majority have found no lesions due to the opaque medium. However, Randerhant described serious lesions in a man who had been



given an injection of 180 c cm. of thorotrast (normal dose 1 gm. per kilogram of body weight). This patient died of carcinoma of the stomach with metastases in the liver one month after the last injection and his liver showed foci of necrosis with Kaposi cells containing granules of thorium.

The author has been unable to find any report of the local action of subcutaneous injections of thorotrast except that of Roussy, Oberling, and Guern who in an article published in 1935, stated that a large percentage of rabbits given subcutaneous and intraperitoneal injections of thorotrast developed subcutaneous or peritoneal neoplasms which showed the histological characteristics of malignancy and were transplantable in series.

Prussia tested these results in experiments on 7 adult and 7 young white rats. He gave 15 injections of from 0.1 to 0.3 c cm. of thorotrast on alternate days into the subcutaneous tissue of the right lower quadrant of the abdomen and after a month a second series of 15 such injections. At the end of the third month after the treatment 6 of the rats were alive. Only 1 of these showed no lesions. In the 5 others a slight infiltration occurred at the site of the injection at the time it was made. This disappeared after two or three weeks but two or three months later a tumor developed at the site of the previous reactive process. Two of the tumors were large and flat, immovable on the underlying tissues and adherent to the skin, and on histological examination showed granulation tissue made up of large cells mostly histiocytes containing granules of thorotrast. The 3 others were round movable and not adherent to the skin, and on histological examination were found to be spindle-cell sarcomas. Tissue from 1 of these tumors grafted into another animal produced sarcoma.

AUDREY GO'S MORRAN M.D.

Ratti A. and Silvestri B. Experimental Researches Concerning a Presumed Antagonism Between Roentgen Rays and Infrared Rays (Ricerche sperimentali su di un presunto antagonismo fra i raggi roentgen e i raggi infrarossi). *Radiol. med.* 1937 24 1

Ratti and Silvestri present a critical discussion of the literature on a presumed antagonism between roentgen rays and infrared rays in the treatment of certain cutaneous lesions produced by x ray and radium therapy.

In a large number of cases of dry dermatitis produced by x rays or gamma rays they found that no favorable effects were obtained with infrared rays. However in cases of moist dermatitis in which almost all of the layers of the epidermis are lost and the derma is exposed infrared ray therapy stimulated repair. This is in agreement with the observations made by other investigators who have employed infrared rays in the treatment of acute or chronic ulcerative radiodermatitis.

From the biological point of view the authors' observations indicated that cells which have been

directly or indirectly exposed to x ray irradiation and form the organic substrate of the lesion or cutaneous change do not respond to any therapeutic attempt with infrared rays regardless of the severity of the lesion (functional impairment regressive or degenerative processes, necrobiosis) but if the injury produced in the cell is reversible the lesion will regress spontaneously within a certain time. On the other hand, if the injury is associated with degeneration or necrosis the vital activity of the cell is impaired permanently and no effect whatever will be obtained from irradiation with infrared rays.

There is no reason to believe that infrared rays exert any regenerating influence upon cells in which the cytoplasm has become vacuolized or the nucleus has undergone pyknosis or karyorrhexis. Neither will the heat evolved from these rays have any effect whatever upon an interstitial edema or the development of a perivascular cellular infiltration.

The authors conclude that it is impossible to influence therapeutically with the infrared rays such cutaneous reactions produced by x rays as erythema, pigment formation, edematous imbibition of the epidermis or derma or desquamation. Heat rays do not have any effect whatever on tissues which have been injured by irradiation but have an effect on non irradiated tissue which is potentially the point of departure of repair processes.

It is irrational to use infrared rays to attenuate the severity of x ray reactions or as a means to increase the x ray dose especially in the cases of individuals whose skin is hypersensitive and in whom a severe reaction may be set up as the result of a synergistic action.

The authors believe that infrared ray therapy is indicated in the treatment of ulcerated cutaneous x ray lesions in which the production of a local hyperemia appears to be desirable. However they emphasize that this is a non specific action and not to be considered antagonistic to the action of x rays or radium.

RICHARD F. SOMMA M.D.

Richards G. E. Radiotherapy in Lesions about the Eye. *Am. J. Roentgenol.* 1936 36 588

There is a rather widespread opinion held by the laity and to a less extent by the profession, that radium cannot be safely applied near the eye. Although having some basis this opinion is not entirely true. With proper precaution the eye will tolerate radium rather well. The chief dangers are (1) corneal ulcer, (2) secondary glaucoma, and (3) cataract. The necessary precaution consists in placing a proper protective shield of gold or silver over the cornea. When this is impossible only gamma rays should be used. The author has noted the development of cataract in only 2 cases.

The author discusses the treatment of benign and malignant lesions of the eye and the surrounding area. Among the benign lesions he includes blepharitis, eczema of the lids, inverted lashes, papillomata, vernal catarrh, keratoses and nevi and angioma of the lids. Blepharitis may be treated by

either radium or roentgen rays. With the cornea protected and the lids everted, a dosage of approximately 25 per cent of an erythema dose, repeated weekly for 3 or 4 times has given good results. The following factors were employed: 90 kv, distance 10 in., no filter, 4 ma min., and 150 r. Eczema of the lids is treated in the same manner. Epilation is indicated for inverted lashes and for this radium is preferred. Papillomas are fulgurated and then given a light dose of radium, insufficient to cause damage to the cilia. In treating vernal catarrh, two methods are described. A rather large quantity of radium, in an almost unfiltered form, may be applied to the everted lid by a method called "ironing." This is done by hand by the operator, using a suitable forceps. The dosage is from 500 to 1,000 mgm min., distributed over the whole lid. The average number of treatments have been 2. In the second method a proper shield of lead is covered with active deposit of radium emanation, and placed in position under the lid. The dose recommended is from 200 to 400 mc min. Keratosis on or near the lids is treated by means of surface application of radium. The author describes two methods of treating nevi and angiomas of the lids. If the lesion is a capillary nevus, limited to the skin, a number of light applications of radium, with a proper shield, will give a satisfactory result. For this type of nevus 10 mgm needles of monel metal are employed, and a dose of from 40 to 50 mgm hr per 1 sq cm. The dose is repeated at intervals of from two to four months. Plenty of time should be taken for the treatment. For the treatment of a true cavernous angioma the author recommends the implantation of gold filtered radon seeds of 0.5 mc strength placed rather widely. This treatment seldom needs repeating and requires care to avoid over dosing.

In a group of 102 patients having malignant lesions around the lids or edge of the orbit, there were only 3 failures. The lesion had been excised one or more times in 2 of these patients. The author feels that excision introduces a great and sometimes insuperable handicap to successful radiotherapy. The cases have been arranged according to the particular problem they present to the radiologist.

Simple rodent ulcer on the lid and remote from the lens or either canthus may be treated by either a surface application or by the implantation of highly filtered needles. The latter is probably the most cer-

tain in its effect. Needles containing 10 mgm each of radium element per cm of length with a wall thickness of 0.5 mm of platinum, are spaced 2.5 mm apart and left in place from four to six hours. One such treatment is usually sufficient.

In treating lesions about the inner canthus the dangers are contracture and deformity of the lid and interference with lacrymal duct function. Almost perfect results may be obtained in the early lesion which has not ulcerated. In cases with moderate degrees of ulceration not much scarring is to be expected, either by surface application or by a small pack. However, if extensive ulceration is present contraction and scarring are inevitable. Heavily filtered radium introduced with needles embedded in the tissues is the preferred method of treatment.

Lesions near the outer canthus without or with slight ulceration are satisfactorily treated by either surface application or the insertion of needles. Epilation of the cilia usually occurs. If these lesions are accompanied by marked ulceration with fixation to the underlying bone, the treatment is more difficult and often unsuccessful. The author prefers the implantation of highly filtered radium needles. Surgical excision should be avoided.

In the treatment of lesions of the cornea, the author discusses hyperplasia, epithelioma, diseases of the lens, and intra ocular neoplasms. Simple hyperplasia of the corneal epithelium usually requires no treatment, but in those cases in which there is interference with vision, the application of radium offers relief. A proper lead shield with an aperture is prepared and placed over the eye with lids retracted. An applicator containing monel metal needles (10 mgm each of radium element) is left in contact with the rubber over the aperture for one hour—from 30 to 40 mgm hr. The rubber secondary filter is considered an important factor.

The treatment of an epithelioma of the cornea differs from that of hyperplasia only in the matter of dosage. The malignant lesion requires more radiation. A survey of the literature led the author to conclude that radiotherapy was not a satisfactory method of treating cataracts. Intra ocular neoplasms are probably most satisfactorily treated by enucleation of the eye, followed by intensive and prolonged irradiation. An analysis of the material based on the treatment of 70 cases is not included in the present paper.

EARL E. BARTH, M.D.

## MISCELLANEOUS

### CLINICAL ENTITIES—GENERAL PHYSIOLOGICAL CONDITIONS

Price N L and Davie T B Renal Rickets *Brit J Surg* 1937 24 348

The authors define renal rickets as a disease of childhood characterized by skeletal demineralization with resultant deformities and associated with chronic renal disease which in uncomplicated cases terminates in uremia. It is possible that this is not a distinct disease entity but a syndrome common to two separate diseases in the late stages. The skeletal changes may be looked upon as the immediate result of parathyroid overactivity as the effect of hyperparathyroidism on the sensitive growing metaphysis is especially severe producing a condition which in children may be indistinguishable from rickets. The hypercalcemia which results from the extensive demineralization of the bones causes in its turn a progressive nephrosclerosis which terminates ultimately in renal failure. Clinically some degree of renal disease and marked nitrogen and phosphate retention is late. Evidence of pituitary or diencephalic disturbances may be present and in conjunction with the history may assist in the differentiation of the condition from a primary renal condition.

The skeletal changes may also be looked upon as the result of congenital or other disturbances in the anatomy and physiology of the renal tract. Evidence of renal impairment appears early and is associated with definite nitrogenous retention and with hyperphosphatemia while the blood calcium remains low. When the metabolic disturbances reach a critical level secondary parathyroid hyperplasia is produced and with the advent of this parathyroid overactivity the skeletal manifestations begin. Progressive decalcification causes general softening of the bones and precipitates the characteristic metaphyseal collapse which plays so important a part in producing many of the more grotesque deformities. Simultaneously there is a rise in the blood calcium above normal level and secondary calcium deposits may form in the kidneys, blood vessels, and elsewhere. From this stage the onset of terminal renal failure is only a question of time. If albuminuria, cylindruria, or any other evidence of renal disturbance preceded the clinical or x ray signs of the bone disease and the condition is associated with relatively low serum calcium and high phosphorus values the condition is probably due to renal disease.

With the appearance of severe renal damage in the first group and of secondary parathyroid hyperplasia in the second a zone of overlap between two etiologically distinct diseases has been reached. It is at this stage that the diagnosis of renal rickets is most frequently made. In the case reported in this

article the hypercalcemia and radiographic features pointed to hyperparathyroidism. At the same time there was such a degree of renal impairment that uremia could not be long in appearing. Little assistance was afforded by the history or by other clinical features with the possible exception of the unusually long standing polyuria and the fact that dwarfism appeared to date from birth. These facts may be adduced as evidence of some form of pituitary or diencephalic disturbance, and it may be presumed that the absence of any congenital renal lesion in the post mortem findings lends further support to this view. The authors conclude that their case was most likely of endocrine origin.

MANUEL E. LICHTENSTEIN M D

Cook J W Haslewood G A D Hewett C L Hieger I, and Others Chemical Compounds as Carcinogenic Agents *Am J Cancer* 1937 49 219

The results obtained in the last few years have shown that a variety of tumors such as carcinoma of the skin, kidney, testis, bladder, liver, and uterus and sarcoma of the subcutaneous tissue, peritoneum, and spleen can be induced by chemical compounds. They indicate that the variety of tumors which occur naturally in different organs and in different species may be due to the production under conditions of disease, of a variety of carcinogenic chemical compounds. However the fact that a natural process can be imitated by the use of an artificial agent does not prove that the agent by which the natural process is brought about has been discovered. So far, no substance subjected to adequate experimental tests has been found to produce only sarcoma or only carcinoma. The increase in the frequency of a naturally occurring form of cancer such for example as cancer of the lung in 20 per cent instead of 5 per cent of mice in the presence of a known carcinogenic agent suggests that this agent can summate with the unknown naturally occurring carcinogenic factor to produce an effective stimulus. Investigation of the chemical carcinogenic agents which were the outcome of studies of industrial cancer has been carried a stage nearer the realm of normal biological phenomena by the demonstration of a structural relationship between some of these compounds and normal constituents of the human body. The laboratory transformation of bile acids into methyl cholanthrene suggests the possibility of the occurrence of such changes in the body.

The various groups of carcinogenic chemical compounds are classified and discussed in the light of their chemical relationships and their biological effects. The most active cancer producing compounds yet encountered belong to the cholanthrene group and are of special interest on account of their relationship to the bile acids. The carcinogenic

properties of 3,4 benzpyrene, a constituent of coal tar, have now been extensively investigated, and the broad principles of molecular structure necessary for activity within the group of hydrocarbons and allied heterocyclic compounds related to 1,2 benz anthracene have been determined. Recent work of Japanese investigators has shown that pathological effects, such as cholangioma, adenoma of the liver, hepatoma, and carcinoma of the bladder, can be produced by the feeding of relatively simple azo compounds. Little progress has been made in elucidating the mechanism of cancer production by chemical compounds, but it is possible to enumerate a number of genetic and other factors which influence carcinogenesis. Tumors have been produced by as little as 0.4 gm of 1,2,5,6 dibenzanthracene.

JOSEPH K. NARAT, M.D.

### DUCTLESS GLANDS

Mortimer, H. Pituitary and Associated Hormone Factors in Cranial Growth and Differentiation in the White Rat. A Roentgenological Study. *Radiology*, 1937, 23, 5.

This is a report of a most detailed study of the rat cranium throughout normal growth. In growth and differentiation the rat cranium is comparable to the cranium in man, therefore, conclusions derived from this work may be used to some extent in interpreting human cranial dysplasia. In order to secure very fine detail, a fine grain emulsion such as is used in miniature cameras, was used. The film was loaded in thin light opaque paper cassettes, and low kilo voltage (below 40 kv) 15 ma, with an exposure of about 8 sec at an anode film distance of 15 in became a standard technique.

Attention is drawn to the intrinsic functional significance of the frontal sinus homologue and the supra ciliary canal in the rat during growth, and more especially in differentiation. The author believes that the changes observed in this area, both after hypophysectomy and after treatment, throw light upon certain human anatomical growth variations seen in the frontal and other accessory sinuses in man.

Complete removal of the hypophysis of the rat at an early age markedly retards cranial growth, especially in its differentiation. After hypophysectomy there is a marked decrease in the vascularity of the bone. As a result, the processes of resorption and deposition are seriously disturbed, the former apparently being more affected than the latter. All growth does not cease, the height and width of the cranium reach normal dimensions, but the antero-

posterior growth suffers. The snout is more affected than the brain case, its growth is inadequate in all directions. After complete operation roentgen examination shows a cranium that is small for its age, and a snout that is small in proportion to the brain case. The calvarian outline corresponds in form to that found at the age at which the hypophysectomy was done, the middle table is hypoplastic, the frontal sinus homologue is hypoplastic, and characteristic tooth changes have taken place.

Incomplete dimensional recovery from these post-operative defects has been produced experimentally by treatment with growth hormones. Somatotrophic (purified growth) hormone seems to have a specific effect on the vascularity of the bone, restoring the normal architectural structure to the diploe, the frontal sinus homologue, and the cancellous bone throughout the cranium. It apparently produces satisfactory growth and differentiation in the snout. The beneficial effect seemed most marked after from thirty to forty days' treatment, but further treatment led to a resistance. With the use of crude alkaline growth extract, the resistance was considerably delayed and a greater increase in the body weight occurred. Incomplete recovery occurred in the snout and teeth, while well marked overgrowth in the anteroposterior direction appeared in the brain case, together with a well marked sclerosis.

In the normal animal, thyroid by mouth and thyrotrophic hormone led to demineralization which affected both the bones and the teeth and was recognizable in the roentgenogram. The prolonged administration of adrenotropic hormone produced similar results in young adult rats, but there was some doubt as to the specific results. Normal animals treated with prolonged parathyroid hormone dosage revealed cranial sclerosis, which was best seen in the calvaria, the frontonasal angle, and the tympanic bulla. In others treated similarly, there was evidence that simultaneous administration of a thyrotrophic fraction inhibited this effect to some extent, similar results were noted after the administration of purified somatotrophic hormone. In hypophysectomized animals, similar treatment produced a similar result, but to a less marked degree, and a much longer period of treatment was necessary to produce it than in the normal animal. Sclerosis was also produced by the prolonged administration of crude alkaline anterior-lobe extracts. Slight sclerosis, or none at all, was found in the normal animal, while marked sclerosis occurred in the hypophysectomized rat as resistance developed. This sclerosis was associated with obesity.

HAROLD C. OCHSNER, M.D.

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NOTE—THE BOLD FACE FIGURES IN BRACKETS AT THE RIGHT OF A REFERENCE INDICATE THE PAGE OF THIS ISSUE ON WHICH AN ABSTRACT OF THE ARTICLE REFERRED TO MAY BE FOUND

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